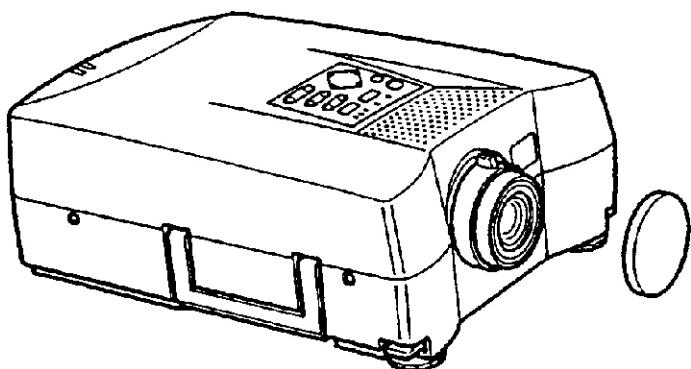


EPSON®
Service Manual

ELP-3500



www.electronicsrepair.net

ELP-3500

Service Manual

INTRODUCTION

This service manual describes hardware information necessary for field service and troubleshooting of the ELP-3500 Projector. Manual updates will be supplied in service bulletins.

HOW TO USE THIS SERVICE MANUAL

The manual covers topics required for field maintenance, so you can use it for diagnosis of failures or repair. Before beginning maintenance work, be sure to read and observe every safety precautions and all rules. Manual contents are as follows:

Precautions: Operator Safety, Product Safety, Requirements for Servicers

Chapter 1: Product Features (Part Names, Connection, Specifications)

Chapter 2: Theory of Operation (Hardware, Internal Connections, Unit Functions)

Chapter 3: Disassembly and Assembly (Main Unit and Remote Control)

Chapter 4: Troubleshooting (Troubleshooting Flowcharts)

Chapter 5: Functional Tests, Adjustments (Test Programs, Adjustments)

Appendix: Parts List, Exploded Diagrams, Schematic Diagrams

PRECAUTIONS

OPERATOR SAFETY

1. PROTECTION FROM ELECTRIC SHOCK

- * Before performing any repair work on the product, be sure to turn off the power switch and remove the electric power cable from the electrical outlet.
- * Whenever it is necessary to turn power on after opening the case or cover (for example, during the adjustment process) be sure to remove anything you are wearing that is metal, such as a watch, cuff links, ring, or tie pin, that may touch metallic parts of the product, creating a danger of electric shock.

2. PROTECTION FROM INJURY

- * Be sure not to touch the lamp and its surroundings after power is turned off; they may be hot. Also, be sure not to touch the light source and its surroundings during adjustments while power is turned on.
- * Use gloves to protect your hands from sharp edges during assembly and disassembly.
- * To protect your eyes from being damaged, do not look into the light source or lens while the light is on.

3. ACCIDENT PREVENTION

- * To prevent the device or its components from falling, perform any operation only after the device is placed on a flat and stable surface. Be careful not to place tools or parts on top of the device or at your feet.
- * To prevent this product from being used before it is totally reassembled, be sure not to leave the product out during any repair work, and do not place it in a location where it can be taken for use by mistake.
- * Be sure to use attached power cable to supply power to the product.

PRODUCT SAFETY

1. ELECTROSTATIC DISCHARGE

- * Whenever performing repair work on the product, be sure to wear a wrist band and use an electrostatic mat for grounding. When you replace any electric components (boards and light bulb), it is recommended that you touch the electrostatic plastic bag containing the component to a metallic part of the product before taking the component out of the plastic bag.

2. RESTRICTIONS FOR PARTS REPLACEMENT

- * Use only authorized parts or EPSON-supplied parts for replacement of mechanical components, including the light source lamp, fuse, air filter, and so on.

- * Use only the power cable and the interface cables supplied with the product.

3. OTHER PRECAUTIONS

- * Visually check for damage or dirt on the power connector and cable. If dirty, clean it, and if bent or damaged, replace the cable in to prevent firing by the flush over phenomenon.
- * When connecting internal connector cables or interface cables, be sure to plug them into the connector fully, until attached to the connector edge.
- * Before removing the FPC cable for the light bulb, be sure to remove the connector lock in advance. Unlock the connector lock by pulling up both ends of the connector lock simultaneously with tweezers.
- * Whenever removing parts or repairing the product, work in a clean room, free of dust and dirt, to keep the optical elements away from dirt.

REQUIREMENTS FOR SERVICERS

Authorized servicers should have the following knowledge and skill for maintenance of the ELP-3500:

- * Training in an EPSON-authorized maintenance training program and authorization as a service engineer.
- * Sufficient understanding of the operations and descriptions in this service manual.
- * Basic knowledge of electricity (safety operations, circuit diagrams, static electricity, etc.)

OTHERS

- * For questions on ELP-3500 maintenance, including service parts or document contents, contact the address below. Any technical information about changes will be released as necessary in service bulletins.

EPSON AMERICA, INC.
20770 Madrona Avenue
Torrance, CA 90503
(310) 782-0770

Contents

Chapter 1 Product Features

1.1 Product Features	1-1
1.2 Parts of the Projector	1-2
1.2.1 Exterior View of the Main Frame	1-2
1.2.2 Interior View of the Main Frame	1-4
1.2.3 Exterior View of the Remote Control	1-5
1.2.4 Interior of the Remote Control.....	1-6
1.3 Connection.....	1-7
1.3.1 MS-DOS and Compatibles	1-7
1.3.2 Macintosh.....	1-8
1.4 Main Components	1-9
1.5 Specifications.....	1-14
1.6 Interface Specifications	1-15
1.6.1 Mouse Interface Specifications	1-15
1.6.2 Computer Interface Board.....	1-18
1.6.3 Computer Audio Input	1-18
1.6.4 Video Interface Board	1-19
1.6.5 I/O Terminal Layout.....	1-21

Chapter 2 Theory of Operation

2.1 Hardware.....	2-1
2.1.1 Electrical System Connections.....	2-2
2.1.2 Optical System Connections	2-3
2.2 Power Supply Unit.....	2-4
2.3 Main Board.....	2-6
2.4 Driver Board.....	2-11
2.5 Interface Board Unit	2-13
2.6 Control Panel	2-15
2.7 Receptor Board.....	2-15
2.8 Speaker Unit	2-16
2.9 Light Guide Block	2-17
2.10 Light Valve R/G/B to Prism Unit	2-19
2.9.1 R/G/B Light Valves.....	2-19
2.9.2 Prism Unit.....	2-20
2.11 Projector Lens.....	2-20
2.12 Lamp Housing.....	2-21

Chapter 3 Disassembly and Assembly

3.1 Disassembly and Assembly Procedures	3-1
3.2 Projector Main Unit Disassembly and Assembly	3-3
3.2.1 Removing the Lamp Inner Housing.....	3-4
3.2.2 Removing the Upper Case Unit and Handle	3-5
3.2.3 Removing the Air Filter Frame.....	3-7
3.2.4 Removing the Main Board Block	3-8
3.2.5 Removing the Exhaust Fan Unit.....	3-11
3.2.6 Removing the Safety Switch	3-12
3.2.7 Removing the Control Panel	3-13
3.2.8 Removing the Speaker Units.....	3-14
3.2.9 Removing the Receptor Board Assembly.....	3-15
3.2.10 Removing the Driver Board Assembly.....	3-16
3.2.11 Removing the Power Supply Unit.....	3-17
3.2.12 Removing the Interface Unit Assembly	3-18
3.2.13 Removing the Lamp Outer Housing Unit.....	3-19
3.2.14 Removing the Adjustable Foot Unit.....	3-20
3.2.15 Removing the Optical Block	3-21
3.2.16 Removing the Projector Lens Unit (PLU)	3-22
3.2.17 Removing the Intake Fan/Optical Head Unit/Light Guide Unit.....	3-23
3.2.18 Removing the Inlet Unit.....	3-25
3.3 Disassembling and Assembling the Remote Control Unit	3-26

Chapter 4 Troubleshooting

4.1 Before Starting Troubleshooting Procedures	4-1
4.1.1 Tools and Accessories Required for Troubleshooting.....	4-1
4.1.2 Field Replacement Parts	4-1
4.2 First Action	4-2

Chapter 5 Adjustments

5.1 Image Adjustment Program.....	5-1
5.1.1 When to Use the Image Adjustment Program.....	5-1
5.1.2 Running the Program	5-2

Appendix

A.1 Reference Materials (Parts List)	A1-A3
A.2 Exploded Diagrams	A4-A5
A.3 Schematic Diagrams.....	A7-A21

1.1 PRODUCT FEATURES

The ELP-3500 Projector is an easy-to-use, portable presentation device with a VGA resolution that lets you project enhanced color images from personal computers and video equipment, such as VCRs, video camcorders, and video disc players.

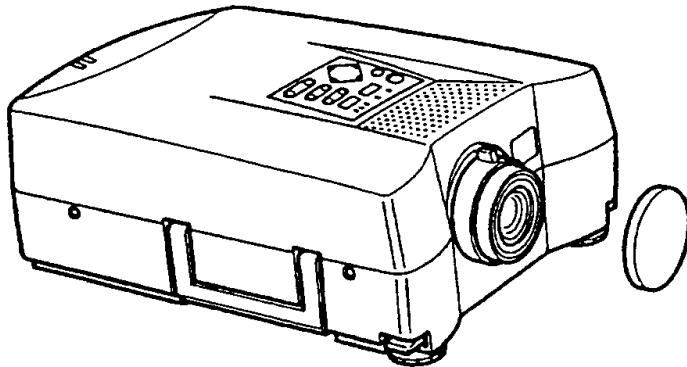


Figure 1-1.

Portable, light-weight, compact

The new power unit, circuit board design, and simple structure minimize the projector body almost to page-size length and width, and a weight of 14.8 lb (6.7 kg), which is about 2 lb (1 kg) lighter than conventional projectors. An optional carrying case is useful for transporting the unit.

Bright, clear images

The high-performance zoom lens, new high-brightness lamp, and optical block let the projector achieve wide-screen image projection (from 21 to 300 inches) at a projection distance from 4 to 40 feet (1.2 to 12.3 m).

High-resolution, full color (16770 thousand colors)

Three R, G, and B TFT liquid crystal panels containing 307,200 pixels support a VGA resolution of 640 x 480 dots (approximately 920 thousand pixels). The grid between pixels in the liquid crystal panel is thinner than in conventional projectors to provide sharp contrast.

Remote control

The easy-to-use remote control handles numerous functions for presentations. You can control the main operations with one hand. By attaching the computer and projector with an optional cable, you can use the remote control as a computer mouse.

Connectivity with various computers

An advanced capacity for data signal determination enables the ELP-3500 to connect with various computers, such as IBM PC compatibles (including DOS compatibles) and Macintosh computers. The projector also can determine whether the video signal is NTSC, PAL, SECAM.

DDC compliance

The ELP-3500 conforms to DDC 1/2 standards. When you connect this device to the computer conforming to DDC, the output signals of it are automatically converted into VGA images and projected.

Simple Maintenance

Maintenance is easy, and the number of adjustments has been minimized.

1.2 PARTS OF THE PROJECTOR

1.2.1 EXTERIOR VIEW OF THE MAIN FRAME

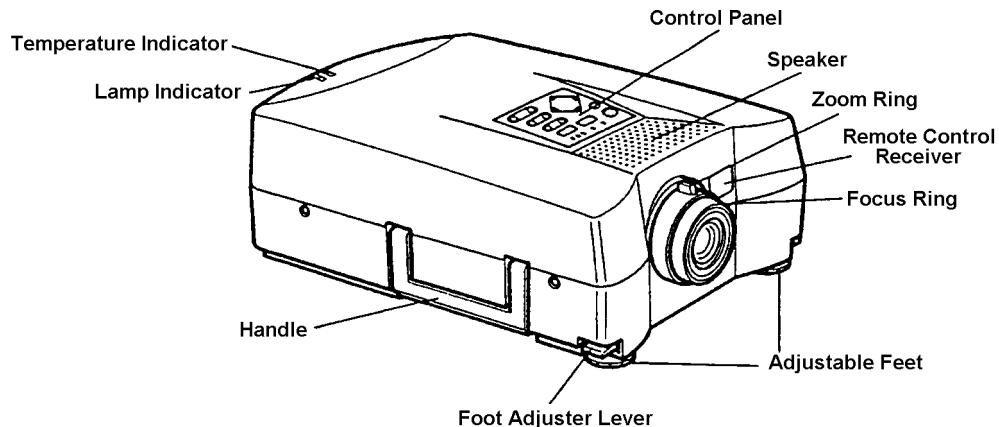


Figure 1-2.

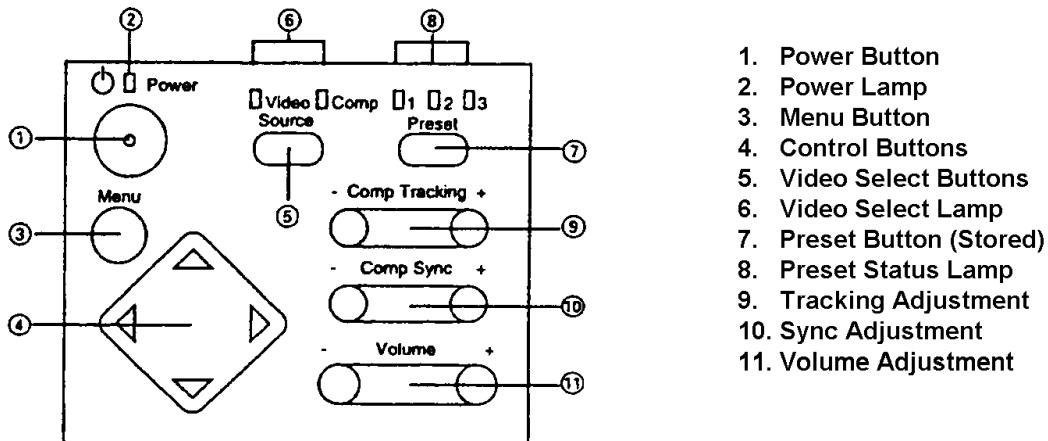


Figure 1-3.

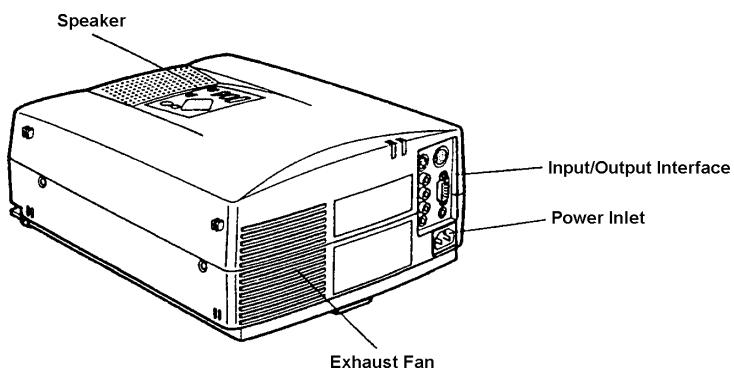
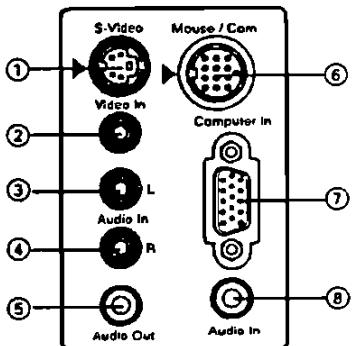


Figure 1-4.

Input/Output Interface



- | | |
|---------------------------------|---|
| 1. VCR Syn-Video | 6. Serial Port to Mouse Port
(DB9 or PS/2) |
| 2. VCR Video | 7. VGA Connection for Video
from Computer |
| 3. VCR Audio Left | 8. Audio from Computer |
| 4. VCR Audio Right | |
| 5. Output for External Speakers | |

Figure 1-5.

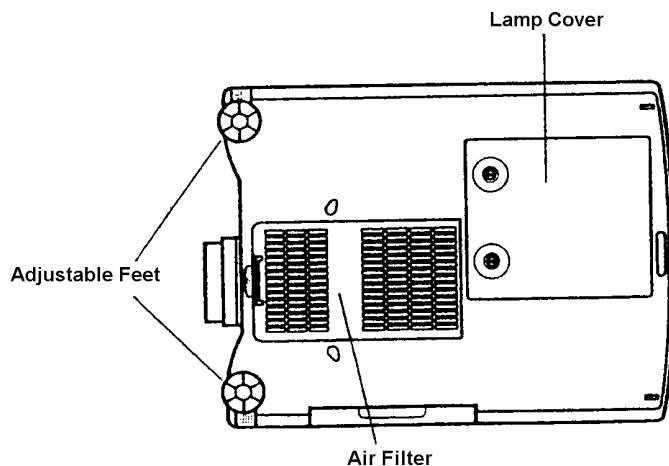


Figure 1-6.

1.2.2 INTERIOR VIEW OF THE MAIN FRAME

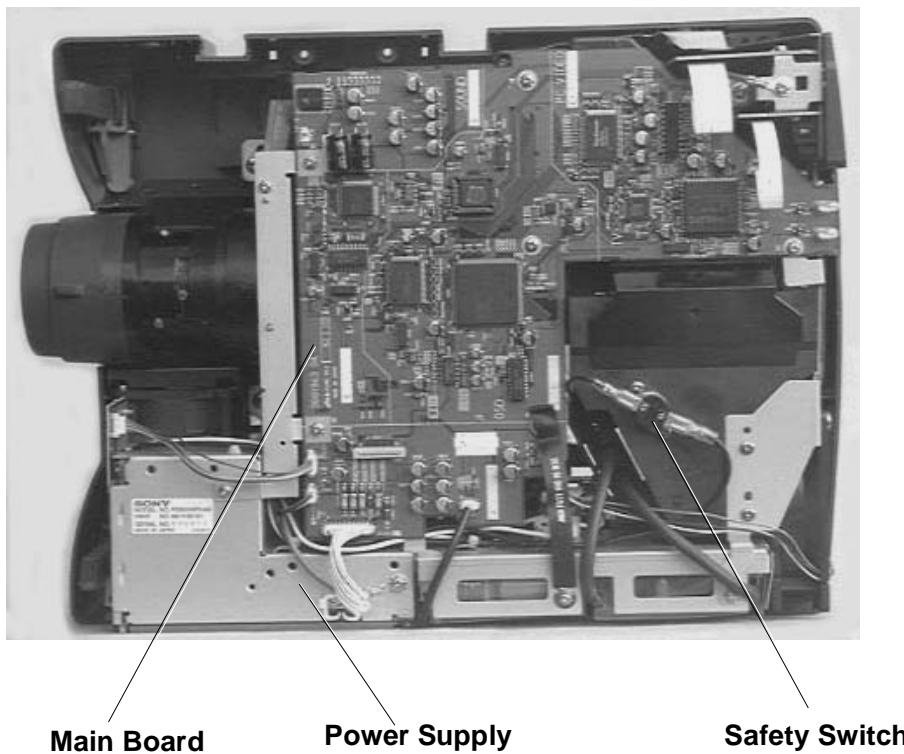


Figure 1-7.

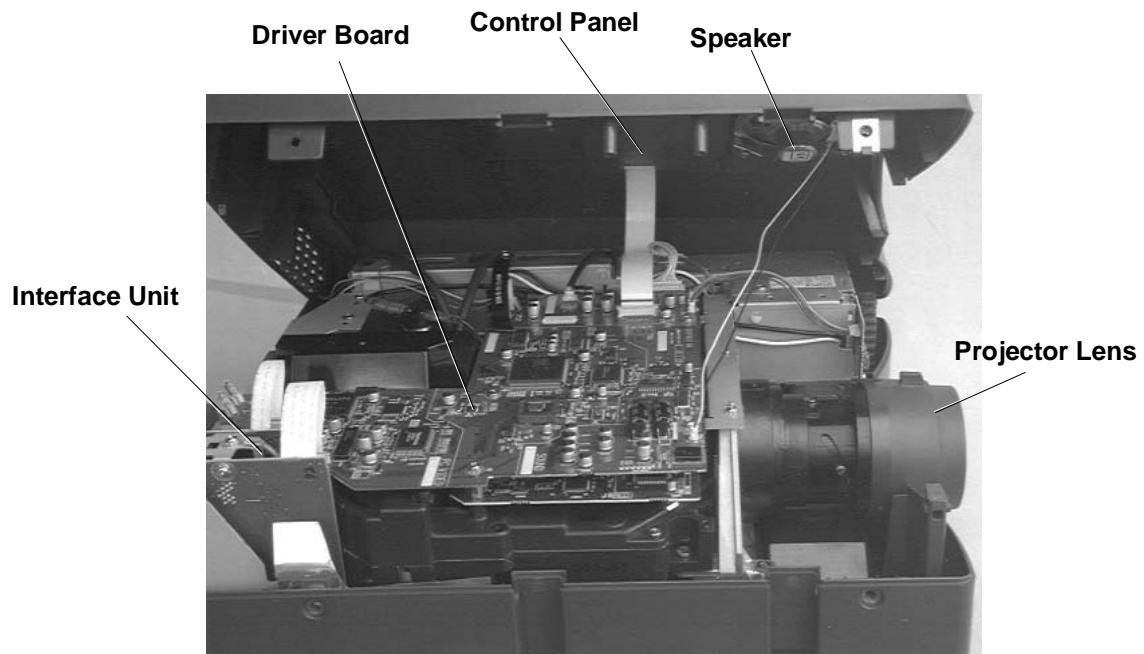


Figure 1-8.

1.2.3 EXTERIOR VIEW OF THE REMOTE CONTROL

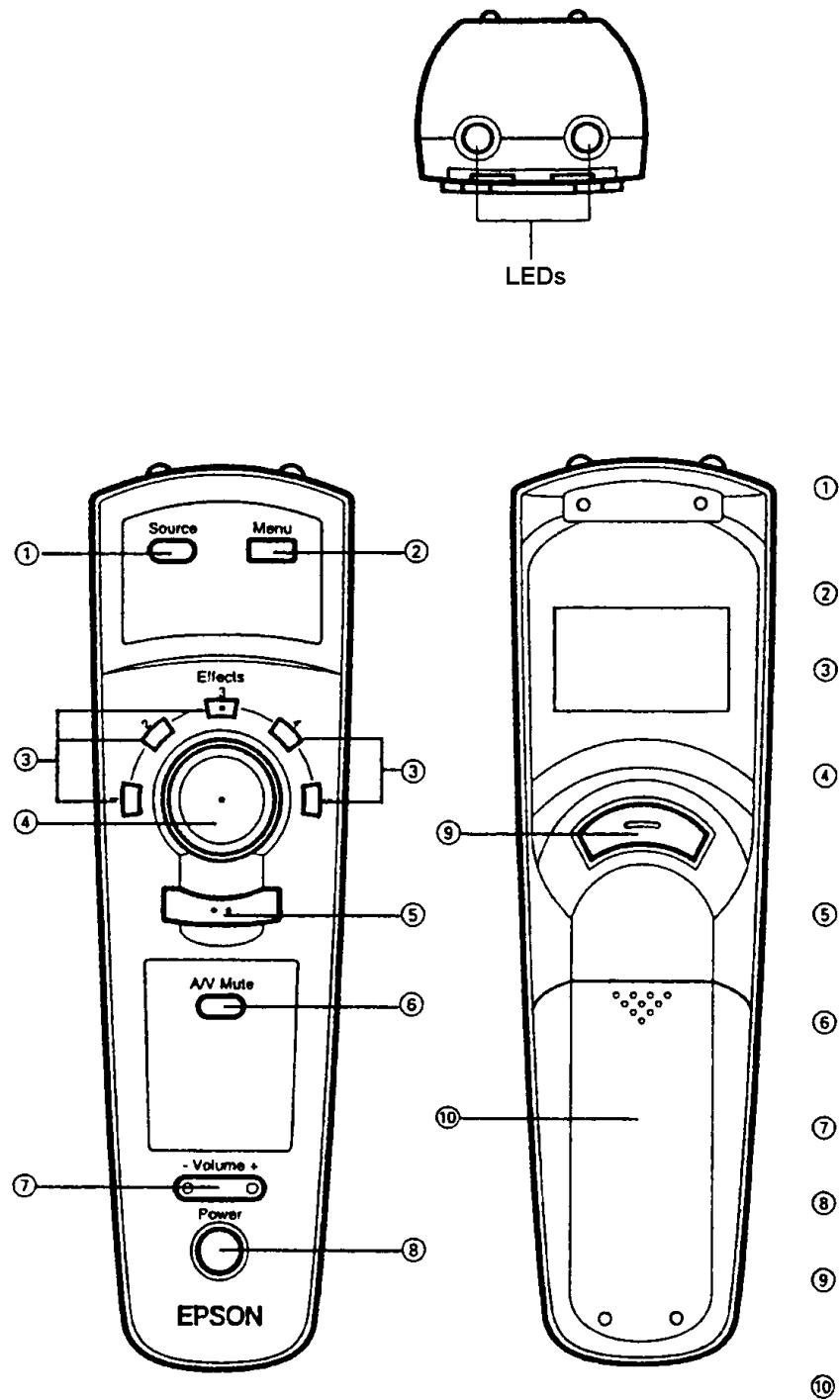


Figure 1-9.

1.2.4 INTERIOR VIEW OF THE REMOTE CONTROL

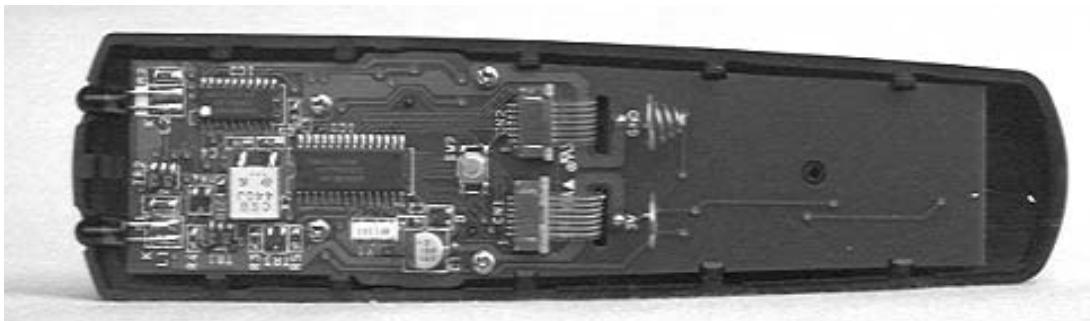


Figure 1-10.

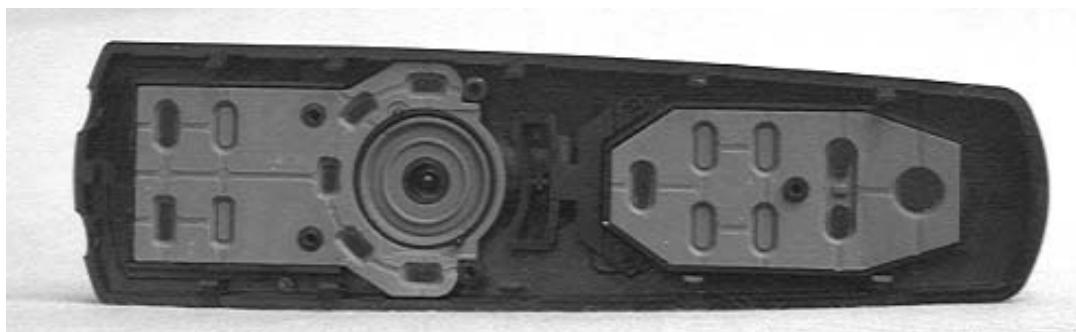


Figure 1-11.

1.3 CONNECTION

1.3.1 MS-DOS and Compatibles

Desktop

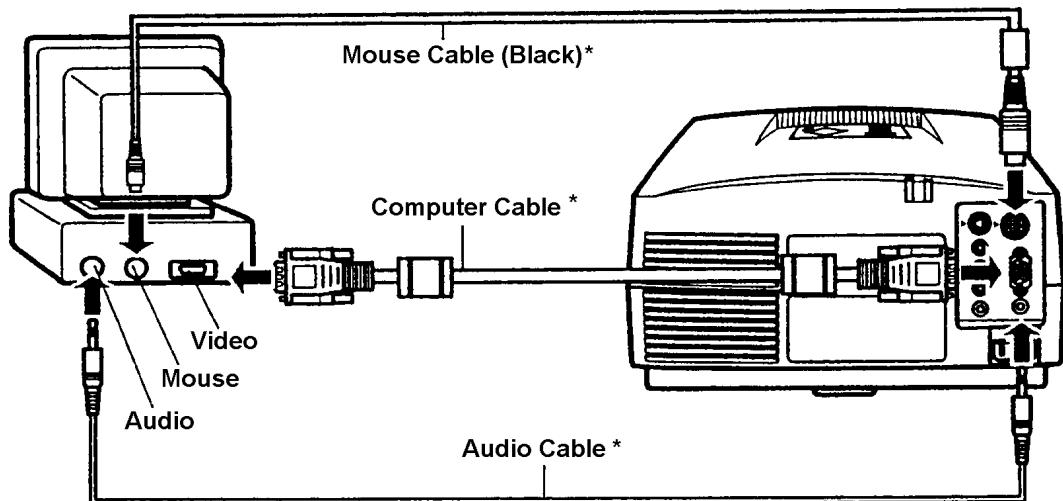


Figure 1-12.

Notebook

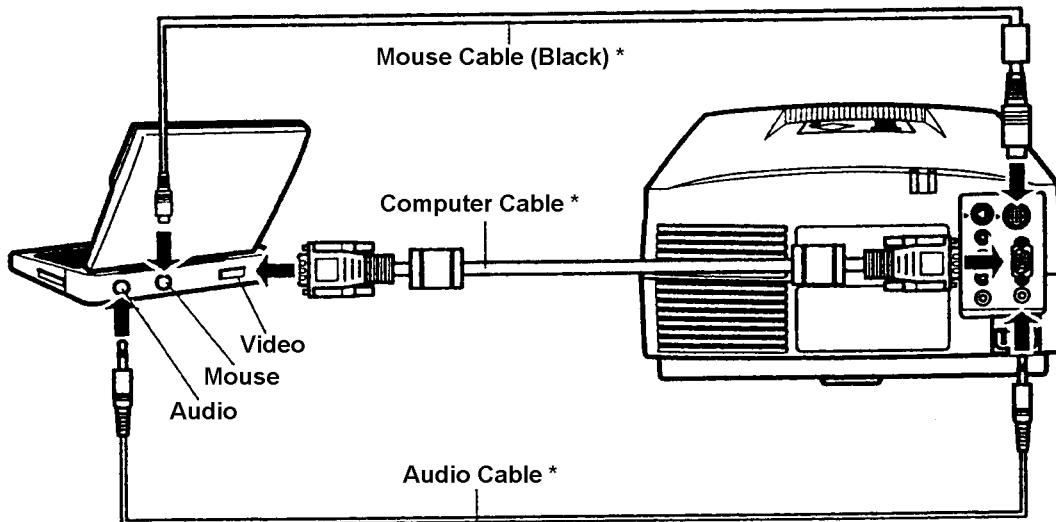
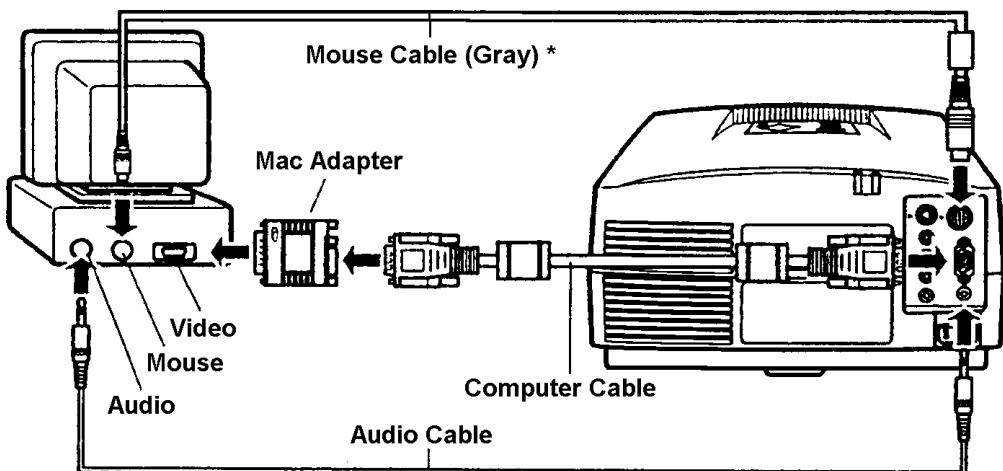


Figure 1-13.

* Attached accessories

1.3.2 Macintosh

Desktop



* Attached accessories

Figure 1-14.

DIP switch settings must match machine type. Refer to the table below for details. (The default setting is MAC13 mode.)

Table 1-1.

Mode	Switch A ON	Switch B ON
MAC13" Mode (640 x 480)	1, 2, 5	8
MAC16" Mode (832 x 624)	2, 4, 5	8
Multi Res.	1, 2, 5	3, 4, 8

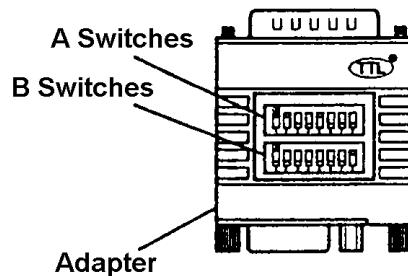


Figure 1-15.

PowerBook

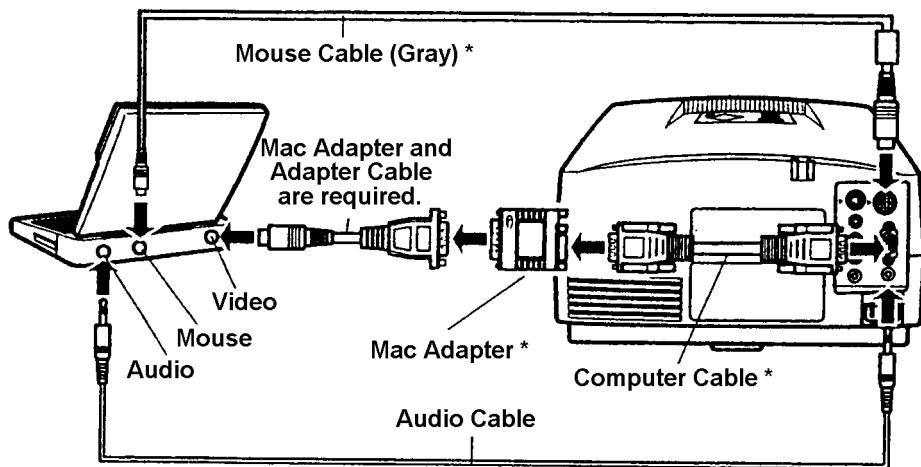


Figure 1-16.

1.4 MAIN COMPONENTS

Main Board

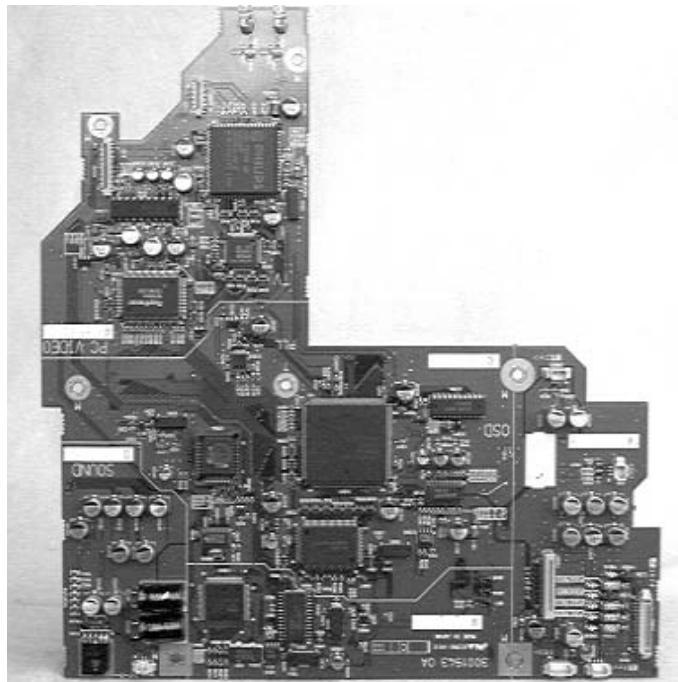


Figure 1-17.

Driver Board

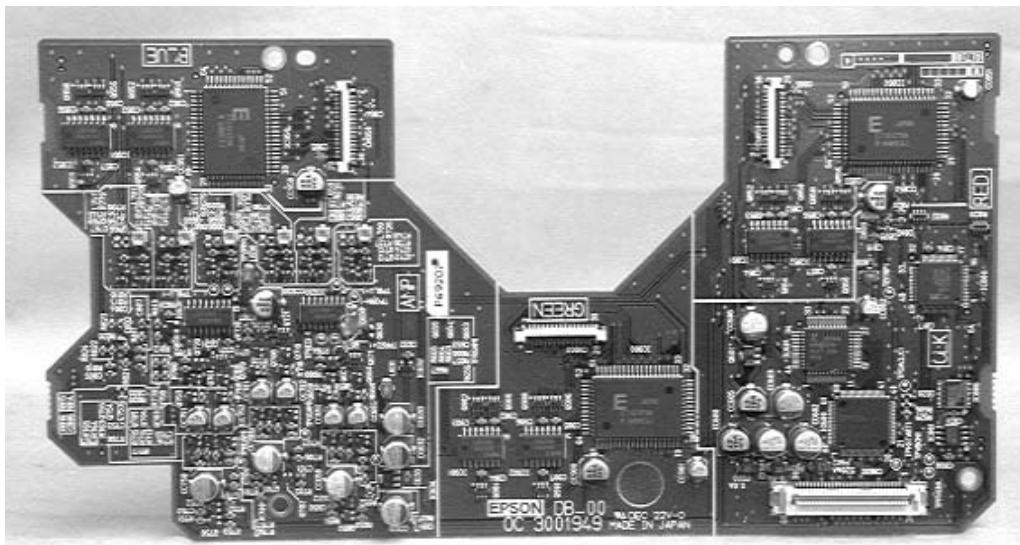


Figure 1-18.

Interface Unit

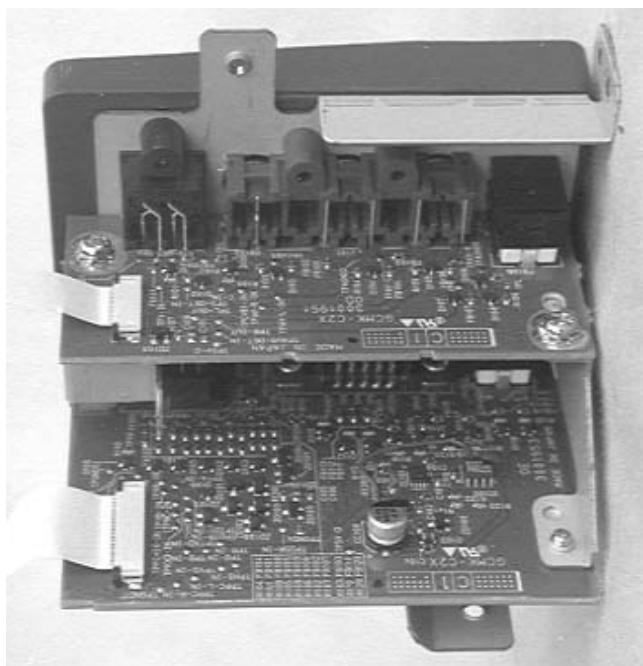
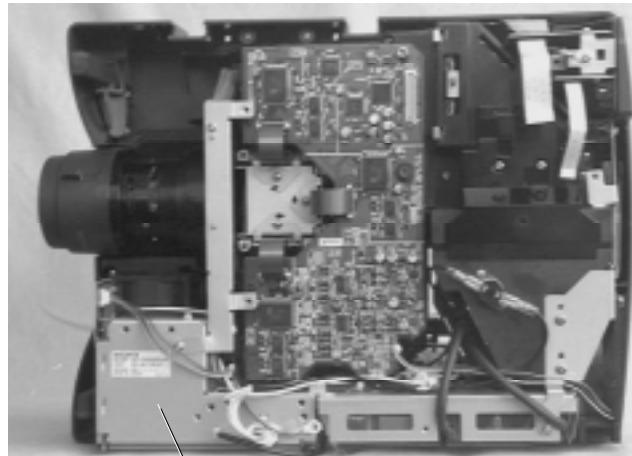


Figure 1-19.

Power Supply Unit



Power Supply Unit

Figure 1-20.

Light Guide Block

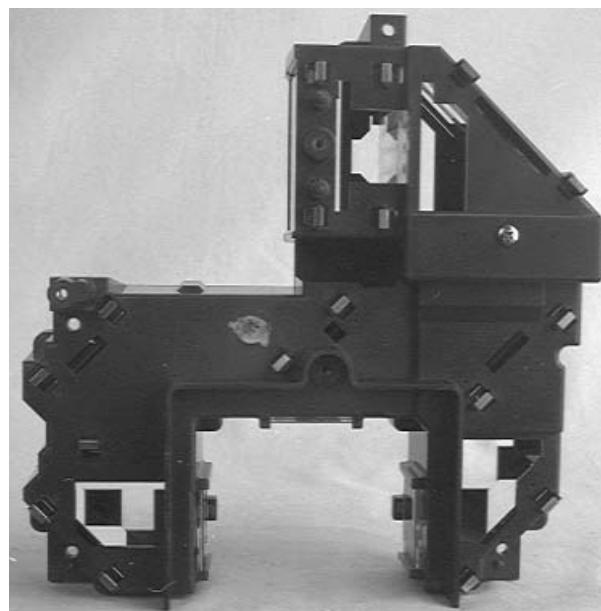


Figure 1-21.

Optical Head Unit

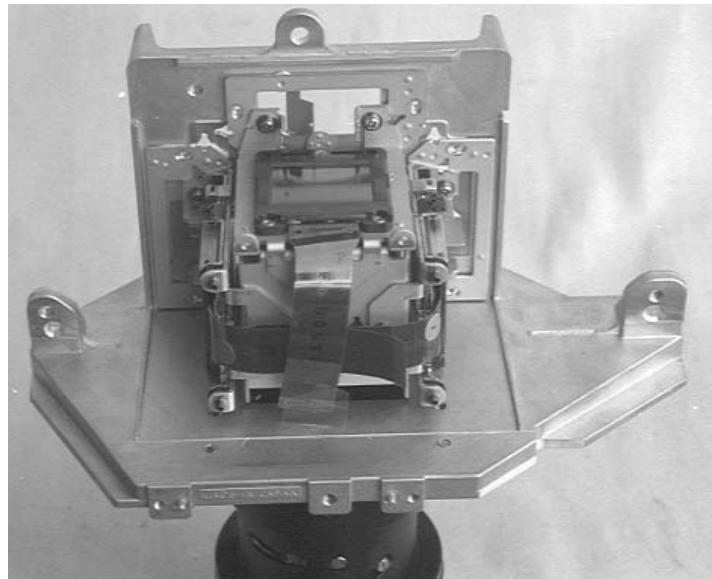


Figure 1-22.

Projector Lens Unit



Figure 1-23.

Lamp Inner Housing

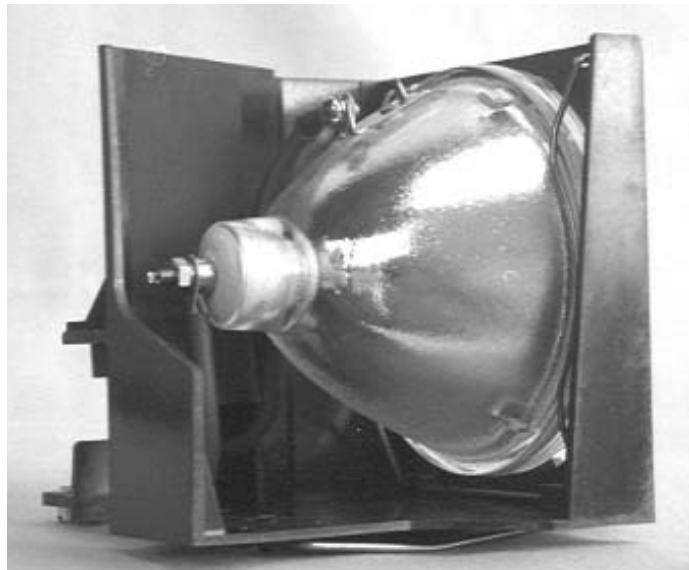


Figure 1-24.

Control Panel

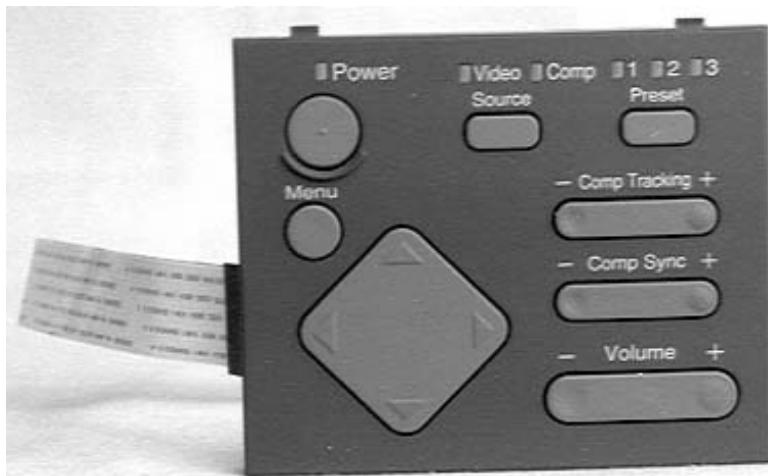


Figure 1-25.

1.5 SPECIFICATIONS

Table 1-2.

OPTICAL FEATURES	
Display method	Transparency-type, TFT color liquid crystal display (R/G/B)
Projection image size	21 inches minimum to 300 inches maximum
Projection distance	3.9 to 40.3 feet (1.2 to 12.3 m)
Resolution	640 x 480 dots; 307,200 pixels x 3
Projector lens	Zoom lens F2.5 - 2.9 (55-77 mm)
Focus adjustment	Manual
Zoom adjustment	Manual (1:1.4)
Light source	100 W Metal halide lamp, (type no. MSCR150E3H)
Average illuminance	Typical: 500 ANSI lumens; minimum: 400 ANSI lumens
AUDIO FEATURES	
Input	Video audio signal (stereo) Host computer audio output (stereo)
Output	Built-in speaker (1 W-8 Ω) 4 W - 4 Ω External speaker Output control function
Input Source 1	Host computer I/O interface (analog RGB/VGA monitor board/video board) Audio input interface (stereo)
Input Source 2	Video image input interface S image input interface Video audio input interface (stereo)
REMOTE CONTROL	
Wireless Remote Control	Within 33 feet (10 m) from and within an angle 30 degrees of the projector's receptor. Wired control is available using the exclusive cable.
Operation Key	One switch available on the top of projector switch cover.
POWER SUPPLY	
Input Voltage	100-120 VAC ± 15% / 220-240 VAC ± 15% (50/60 Hz)
Power Consumption	Approximately 170 W
DC Output	12 V; 0.35 A
MECHANICAL	
Dimensions	11.14 (W) x 5.95 (H) x 14.98" (D) (283 mm x 151 mm x 380 mm) 11.22 (W) x 5.87 (H) x 16.26" (D) (285 mm x 149 mm x 413 mm) including foot adjuster and lens.
Weight	Approximately 17 lb (7.7 kg)
ENVIRONMENT	
Operation/Storage Temperature	32° F ~ +104° F / -14° F ~ +140 ° F (non condensing) (0° C ~ +40° C / -10° C ~ 60° C)
Operation/Storage Humidity	20% ~ 80% / 10% ~ 80% (non condensing)

1.6 INTERFACE SPECIFICATIONS

1.6.1 Mouse Interface Specifications

Features

This interface is provided on an optional cable (not on the projector).

- Supports a keyboard as well as a mouse
- Mini DIN 6-pin connector
- I/O data communication is enabled.

PS/2 port pin assignments

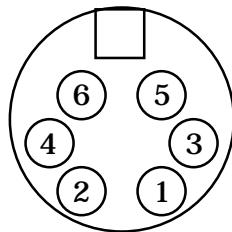


Figure 1-26. Mini DIN 6-pin Connector

Table 1-3. PS/2 Connector Pin Assignments

Pin	Signal	Functions
1	Data	I/O data bus. The signal line with the open collector driver is pulled up to 5 V through a pull-up resistor.
2	NC	Not connected
3	GND	Ground
4	+5V	+5 V output
5	Clock	Synchronous clock signal. The signal line with the open collector driver is pulled up to 5 V through a pull-up resistor.
6	NC	Not connected

PS/2 port driving procedure

The projector communicates with the peripherals using the IBM PC/AT protocol, which manipulates the HIGH/LOW level of Data/Clock signals.

Asynchronous Data Bus (ADB) Port

Features

This interface is provided on an optional cable (not on the projector).

- 10 kbps serial bus
- Supports a keyboard or a mouse.
- Mini DIN 4-pin connector
- I/O data communication is enabled.

ADB port pin assignments

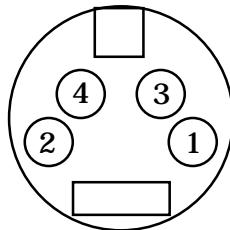


Figure 1-27. Mini DIN 4-pin Connector

Table 1-4. ADB Connector Pin Assignments

Pin	Signal	Functions
1	ADB	I/O data bus. This is the open collector signal, which is pulled up to +5 V through the $470\ \Omega$ resistor on the main logic board.
2	POWER ON	In Macintosh-type computers this pin is connected to pin 4, so that using a key on the ADB keyboard activates this signal and turns on the power. In other models this pin is not connected.
3	+5 V	+5 V output
4	GND	Ground

Procedure for driving the ADB port

An ADB device communicates with a Mac through a protocol specified by Apple Computer Inc., which manipulates the HIGH/LOW level of ADB signals.

ADB port current limitations

Through the bus, a +5 V current is supplied to the ADB device. The total current consumed by the device must not exceed 500 mA. (For example, the current consumed by an ordinary mouse is approximately 20 mA.)

Mouse Emulation Function

This function converts data transmitted from a remote control into mouse data for a PS/2, ADB, or serial mouse. The ELP-3500 mouse function does not support a serial mouse. In the I/F CPU, the function controls the mouse CPU, which controls the multi-mouse port.

Table 1-5. Multi-mouse Connector Mode

Mode	ID 0	ID 1	Note
Serial mouse	0V	0V	Not supported in the ELP-3500
PS/2	0V	5V	
ADB	5V	0V	
PC-98	5V	5V	

The mouse is specified by the cable connected to the multi-mouse connector.

Table 1-6. Multi-mouse Connector Pin Assignments

Pin	Signal	Type	Functions
1	XA/CLK/ADB		Encoder signal / I/O data signal / synchronous clock signal
2	XB/DATA		Encoder signal / I/O data signal
3	YA		Encoder signal
4	YB		Encoder signal
5	LEFT/ID0		Left button signal/control signal
6	RIGHT/ID1		Right button signal/control signal
7	NC	Common	Disabled
8	TxD	Serial	Transmit signal
9	RxD	Serial	Receive signal
10	DTR	Serial	Projector data terminal ready signal
11		Serial	PC data set ready signal
12	DSR	Common	PC power ON signal
13	GHD	Common	Ground

The current capacity of the multi-mouse port

The supplied current capacity is 50 mA. (For example, the current consumed by an ordinary mouse is approximately 20-30 mA.)

In sleep mode

In sleep mode the mouse emulation function is also enabled.

1.6.2 Computer Interface Board

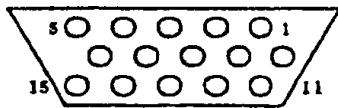


Figure 1-28. Computer Video Input

Table 1-7. Computer Video Input D-SUB 15 (HD)

Pin	Signal	Pin	Signal
1	Red video	9	+5 V
2	Green video	10	Synchronous GND
3	Blue video	11	Monitor (ID bit 0)
4	Monitor (ID bit 2)	12	SDA
5	GND	13	Horizontal synchronization
6	Red video GND	14	Vertical synchronization
7	Green video GND	15	SCL
8	Blue video GND		

1.6.3 Computer Audio Input

This connector is a stereo mini jack with 2 circuits for detection pins (The detection pins, which are not required for audio input, provides an audio out terminal.)

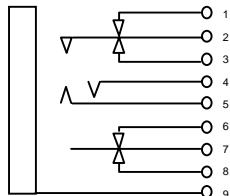


Table 1-8.

Pin No.	Signal
1	GND
2	Computer audio input L
3	Computer audio input R
Other pins	NC

Figure 1-29. Multi-mouse 13-pin Jack

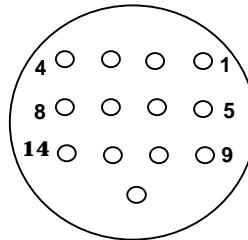


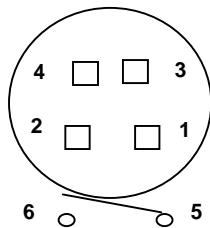
Figure 1-30.

Table 1-9.

Pin	Signal	Pin	Signal
1	DATA	8	LEFT
2	CLK	9	RIGHT
3	ADB	10	ID2
4	XA	11	ID3
5	XB	12	+5 V
6	YA	13	GND
7	YB		

1.6.4 Video Interface Board

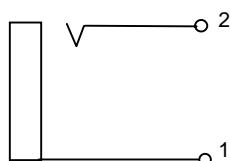
S-terminal input

**Figure 1-31. Mini DIN 4-pin with Detection Pin****Table 1-10.**

Pin	Signal
1, 2, 6	GND
3	Y signal input
4	C signal input
5	Input detection terminal

CVBS input

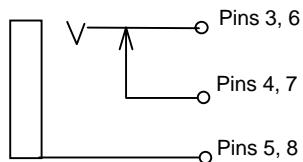
RCA, gold-plated connector (only insertion portion), right angle H=15 mm; color: yellow

**Figure 1-32.****Table 1-11.**

Pin	Signal
1	GND
2	Video input

Video audio input L, R

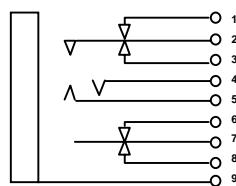
RCA, gold-plated connector (only insertion portion), right angle H=15 mm;
colors: L = white; R = red

**Figure 1-33.****Table 1-12.**

Pin	Signal
3, 6	GND
4	Audio R return
7	Audio L return
5	Audio input L
8	Audio input R

Audio output

Stereo mini jack with 2 circuits for detection pin

**Figure 1-34.****Table 1-13.**

Pin	Signal
1, 4	GND
2	Audio output L
3	Audio output R
5	Detection of Line-out jack insertion
Other pins	Not connected

1.6.5 I/O Terminal Layout

The terminals listed below are vertically located in two rows on the rear panel.

Table 1-14.

Left row, from top to bottom	S-Video terminal input (mini DIN 4)
	CVBS video input (RCA-yellow)
	Video audio input (RCA-left-white)
	Video audio input (RCA-right-red)
	Audio output (stereo mini)
Right row, from top to bottom	Multi-mouse jack
	Computer video input (D-SUB 15)
	Computer audio input (stereo mini)



Figure 1-35.

2.1 HARDWARE

The optical and electrical systems are the major areas of projector hardware. The lower level (below the broken line in the figure) shows the optical system, and the upper level shows the electrical system.

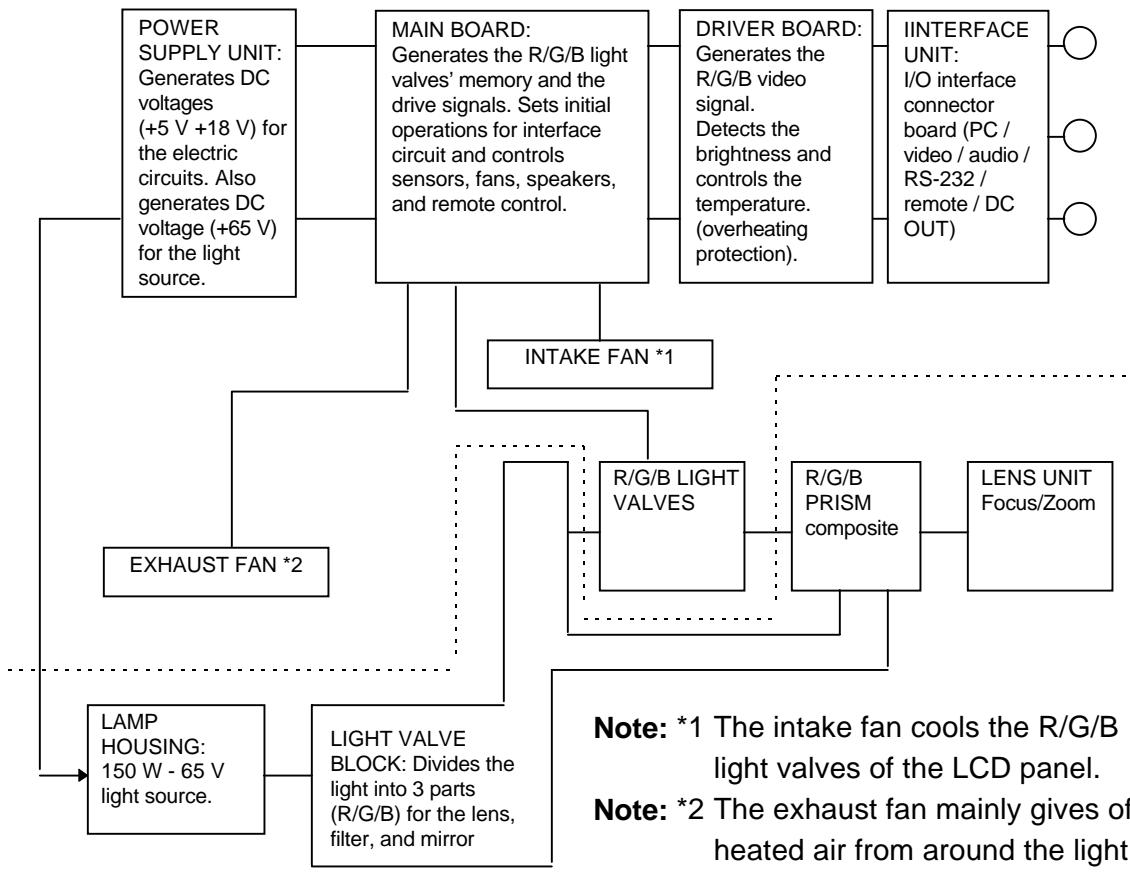


Figure 2-1.

Description of the Projection Process

1. A video signal is provided in digital or analog form from a computer through the interface board. (Analog signals are converted into digital signals by the main board.)
2. The digital video signal is then stored in video memory on the main board. Then the driver board generates signals to drive the R/G/B light valves.
3. The R/G/B light valves are individual panels, independent of each other. They work to shut off or transmit light from the light valve block.
4. Lights transmitted through the light valves are combined by a prism and projected through the lens unit.

2.1.1 ELECTRICAL SYSTEM CONNECTIONS

Electrical units are physically connected to the main board, as shown below.

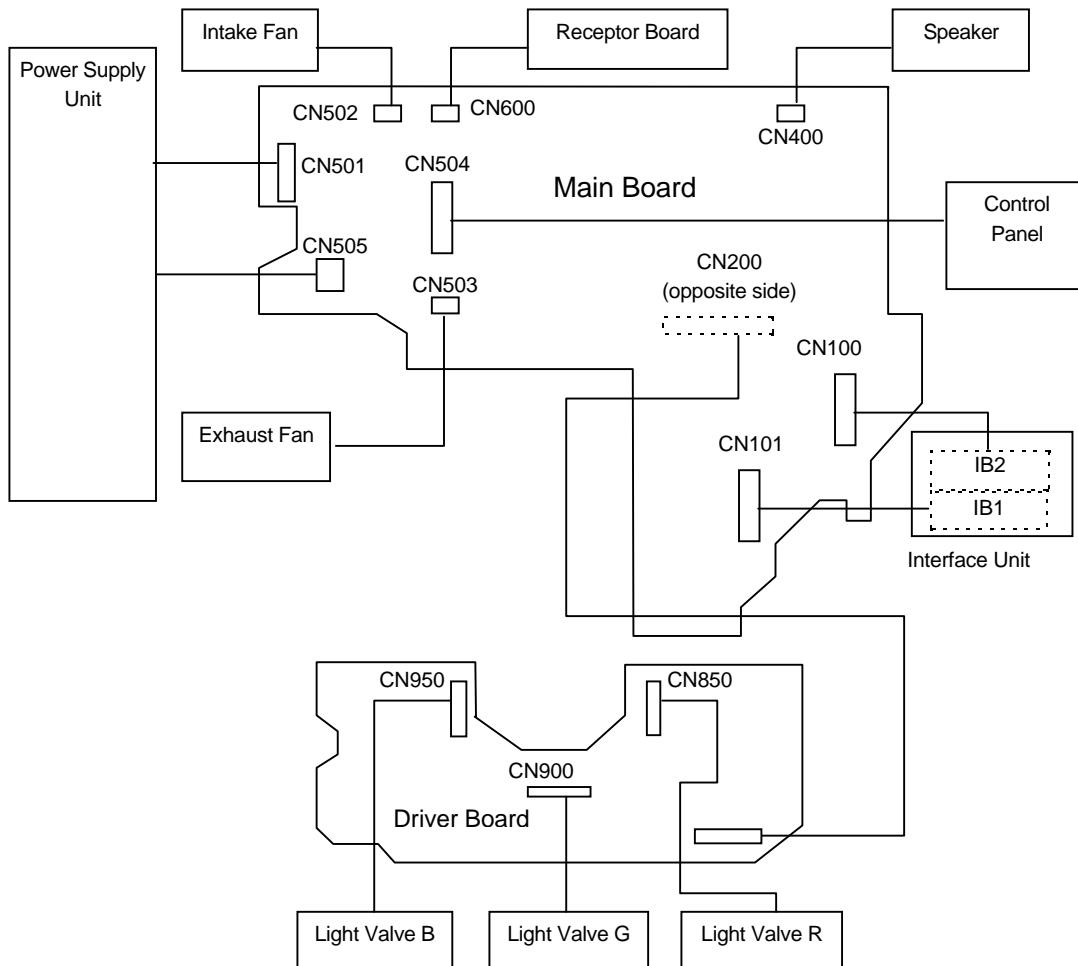


Figure 2-2.

Table 2-1.

UNIT NAME	FUNCTIONS AND REMARKS
EXHAUST FAN	For eliminating heat from light source lamp and power supply unit
RECEPTOR BOARD	Remote control signal detection
INTAKE FAN	Cools the lamp
POWER SUPPLY UNIT	Generates 65 V from AC IN for light source lamp Generates +5 V / +12 V / +18 V
MAIN BOARD	Projector function control (CPU, ROM, VRAM, light valve driver, others)
R/G/B LIGHT VALVE	Generates image data (LCD panel)
SPEAKER UNIT	Audio output
LIGHT SOURCE LAMP	For image projection (metal halide discharge lamp)
DRIVER BOARD	A/D converter for analog video signal Audio signal amplitude, others
INTERFACE UNIT	External device connection

2.1.2 OPTICAL SYSTEM CONNECTIONS

The optical system consists of 4 blocks (lamp inner/outer housing, light guide unit, optical head, and projector lens), as shown below.

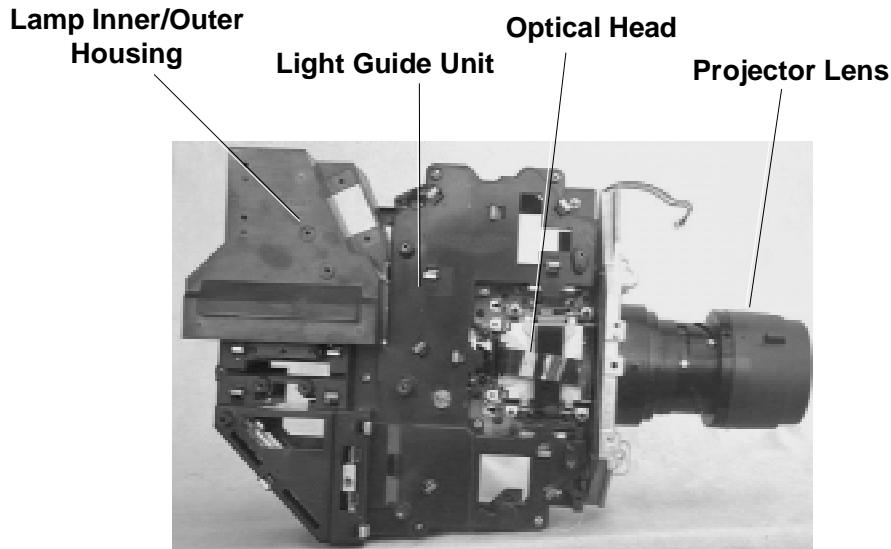


Figure 2-3.

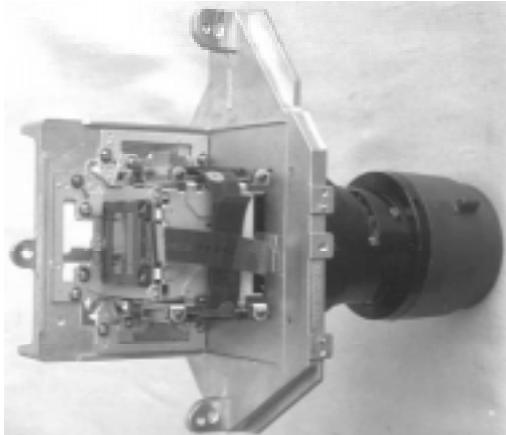


Figure 2-4. Optical Head Assembly

Table 2-2.

UNIT NAME	FUNCTIONS AND REMARKS
LAMP INNER/OUTER HOUSING	Includes one metal halide lamp as a light source. Lamp inner housing and lamp outer housing are mounted.
LIGHT GUIDE UNIT	Disperses light from the light source uniformly using the A/B lens array.
	Disperses the light in three parts (R/G/B).
PROJECTOR LENS	Zoom (*1.4) and focus adjustments

2.2 POWER SUPPLY UNIT

The power supply unit includes a DC regulator, exhaust fan, and interlock switch for the lamp cover. This unit generates the voltages for the control circuit (+5 V, +12 V, +18 V) and for the light source lamp (+6.5 V) from the AC input. Although a functional diagram is shown below, never disassemble the power supply unit during field maintenance service.

Power Supply Unit

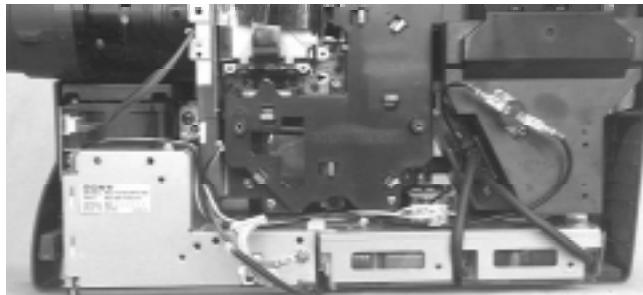


Figure 2-5.

Functional Block Diagram

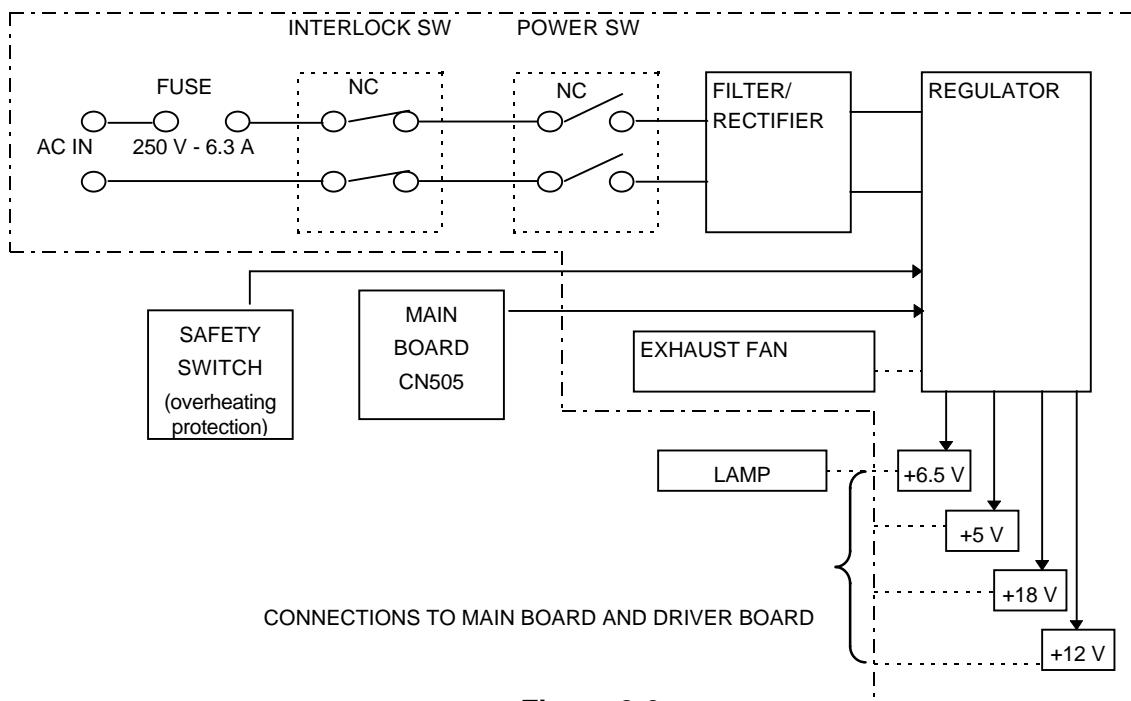


Figure 2-6.

* An interlock switch is included for safety purposes. The interlock switch shuts off the supply of AC power if the lamp cover at the bottom of main chassis is opened.

* The safety switch input signal is designed for protection from overheating. It stops power output to the light source lamp if the projector detects overheating in the lamp housing area.

Functional Outline

- * The interlock switch at the bottom of main chassis shuts off AC power when the lamp cover is opened. It is normally in the ON position.
- * The cable connected to CN505 on the main board is a signal line to indicate the conditions of two fans (the exhaust fan and intake fan), which are connected to connectors CN503 and CN502 on the main board. These signals shut off power to the light source lamp to prevent overheating if either fan stops rotating.
- * The filter/rectification circuit reduces noise on the AC line and generates DC voltage for the regulator.
- * The regulator generates various DC voltage levels shown in the table below for the switching regulator. The regulator detects the voltage output level on the +5 V line and feeds the information back to the switching circuit to maintain a stable output level, regardless load variations. Every output voltage level is not subject to adjustment.

Table 2-3.

OUTPUT VOLTAGE	SPECIFICATION
+18 V	+18 V \pm 5% (17.1 to 18.9 V)
+12 V	+12 V \pm 5% (11.4 to 12.6 V)
+ 5 V	+ 5 V \pm 5% (4.75 to 5.25 V)

- * The intake fan removes heat generated in the power supply unit. Heat expelled by the intake fan is blown out by the exhaust fan, connected to CN503 on the main board.

Pin Assignments

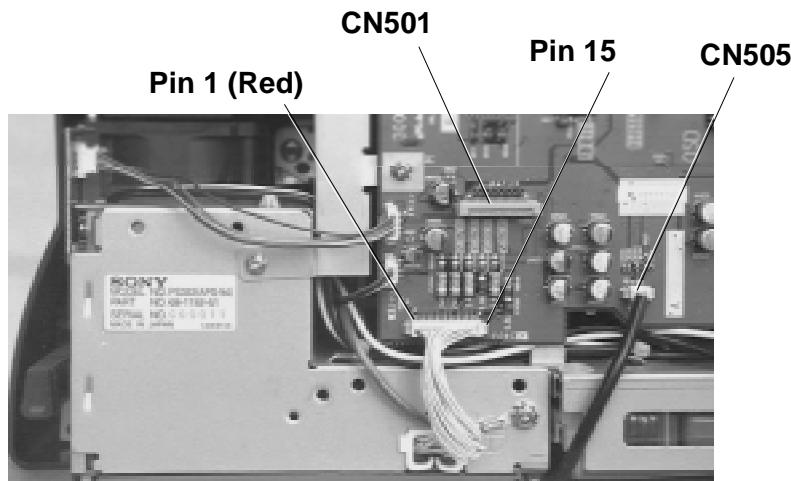


Figure 2-7.

Table 2-4.

Pin No.	I/O	Signal
1	IN	Lamp on/off
2-9	—	Ground
7	OUT	+18 V
8	OUT	+12 V (b)
9	OUT	+12 V (a)
10-12	OUT	+5 V

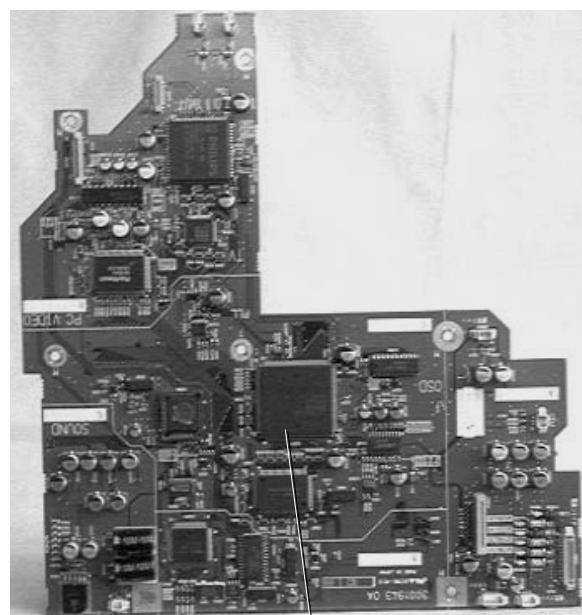
2.3 MAIN BOARD

The driver board consists of the CPU, P-ROM, video memory, digital video processor, and circuits to control the interface, control panel, fan, speaker, receptor board interface, etc. The driver board controls everything, except video signal generation. The driver board is available as a unit for the service parts.

IC304 includes firmware to set initial values and control projector functions. Fuses, for the protection of the electric circuits, are soldered on the board. Their locations are shown on the next page.

Table 2-5.

Fuses	Specifications	Purpose	
FU500	451002 (2 A)	+18 V	ROM/Interface
FU501	451002 (2 A)	+12 VS	Fan/speaker
FU502	451002 (2 A)	+12 VA	Interface
FU503	CCP2E20 (0.8 A)	+5 VA	A/D converter
FU504	451002 (2 A)	+5 VD	All circuits/CPU/interface
FU505	CCP2E20 (0.8 A)	+5 VT	Receptor circuits

**IC304****Figure 2-8.**

Main Board Circuit Block

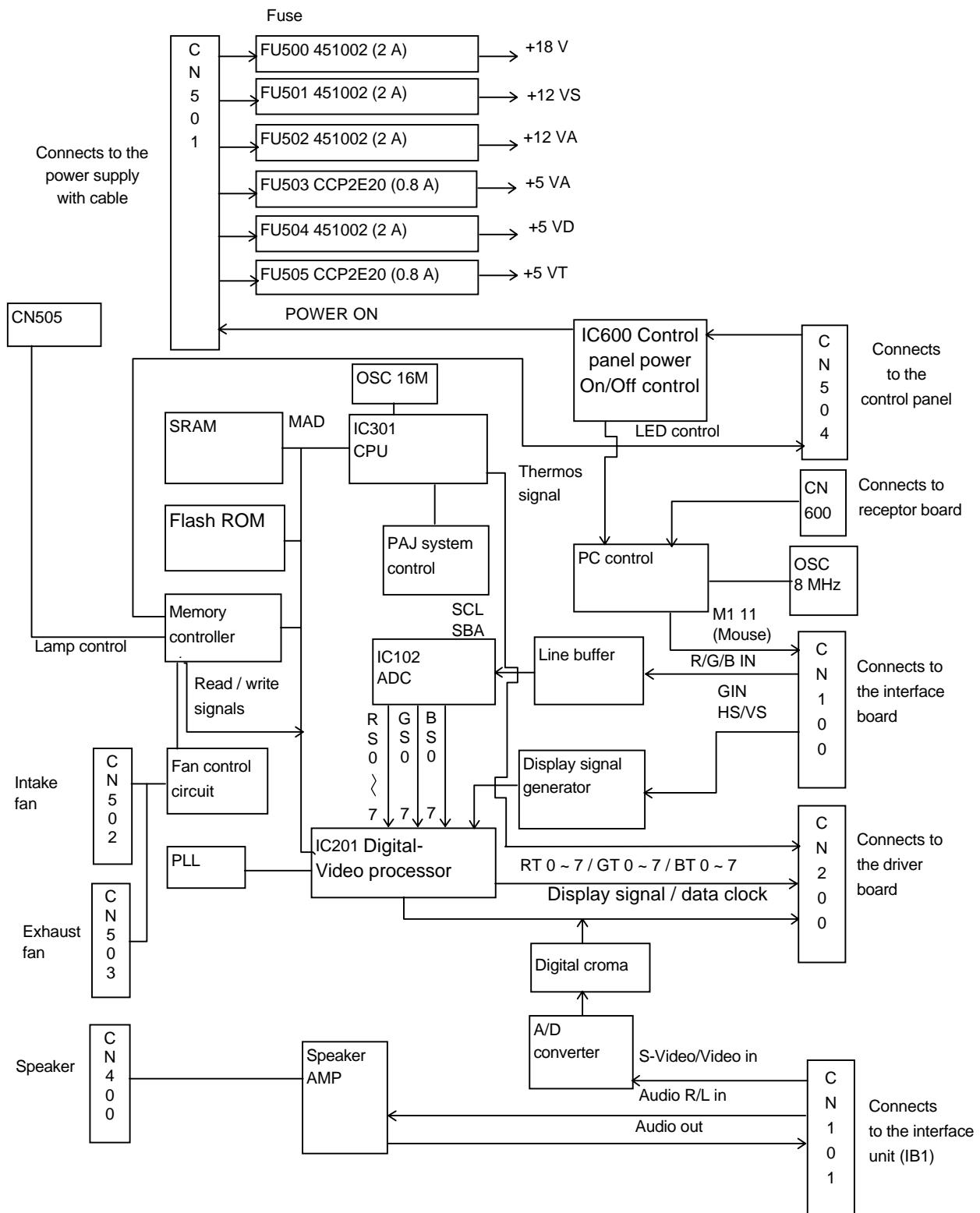


Figure 2-9.

Functional Outline

- * When power is turned on, the driver board activates the reset signal, which is controlled by IC601, and the CPU reads the program from flash ROM and writes it into RAM (IC303). Then the CPU sets the functions based on the program and projects the initial image.
- * The digital video interface (IC201) from the video board generates timing to project the image data received or executes data bit conversion (A/D) to write the received analog image data to SRAM.
- * The memory controller (IC302) performs read/write operations, saving data to SRAM. Video signals (analog/digital), provided through the interface board, are immediately stored in video RAM.
- * Data stored in SRAM is converted to analog signals by D/A converter. The output is divided into 8 bits for each R/G/B light valve by the amplitude and lamp circuits.
- * Digital R/G/B input signals are synchronized as image data, and the control timing is stored in a three-state buffer before being output to the driver board.
- * The analog R/G/B signal is amplified by the amplitude circuit and converted into individual data signals of 7 bits each by A/D converter circuit before being output to the driver board.
- * Analog R/G/B output signals are transmitted in different ways for analog input and digital input.

Analog R/G/B

Video amplitude is output via video buffer.

Digital R/G/B

The digital image signals (R 0 ~ 7 / G 0 ~ 7 / B 0 ~ 7) output from the driver board are converted into analog signals by the chroma circuit and the D/A converter before being output through the video buffer.

- * Audio input volume is controlled (Loud/Quiet/Mute) by the audio control circuit and amplified by the audio amplitude circuit before being output to the speaker unit (Right/Left) through the driver board.
- * The audio input signal is transferred to the audio output interface via the audio control circuit.

- * The projector has a timer circuit that controls the operating time of the light source valve. Its operation is described below.

Table 2-6.

Light Source State	Lamp Monitor State
Typically, the light from the projector lamp starts to dim after about 4000 hours of use. This indicates that it is time to replace the lamp. You can check the lamp life on the Setting Screen.	
When the light source valve runs out before its life.	The lamp monitor lights red.

If you observe the conditions above, replace the light source valve and reset the timer as follows:

While holding down the TRACKING+ and SYNC+ buttons, press and hold down the POWER button until the three status lights (USER 1, 2, 3) start flashing orange simultaneously (for approximately 3 seconds).

2.4 DRIVER BOARD

The driver board has a circuit for converting the signals from the main board into six analog signal states and controlling the brightness and detecting the temperature. The board can be replaced as a whole unit for maintenance service. The fuses on the board are shown below.

Table 2-7.

Fuse	Part Number	Usage
F600	CCP2E20	+18 V (600 mA) Video AMP
F601	CCP2E20	+12 V (600 mA) DAC/Light Valve Driver
F602	CCP2E13	+5 V (520 mA) Control Circuits

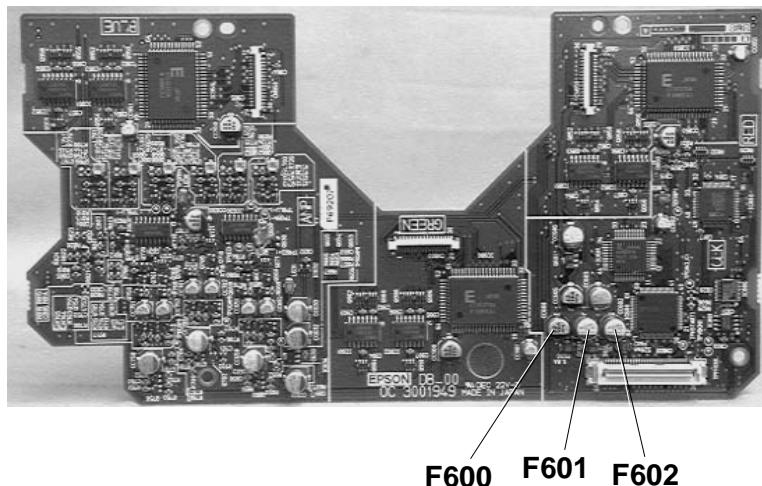


Figure 2-10.

Functional Outline

Signals RT 0~7, GT 0~7, and BT 0~7, output from the main board, are converted into analog signals by the digital to analog converter (DAC: IC601) before being output to the driver circuit for the light valves.

Timing signals (for the monitor) output from the main board are converted into the signals for the light valves (LCDs) by IC800 before outputting them. The sub-brightness circuit modifies the output level of the R/G/B analog signals while controlling the lamp circuit for the analog display signals.

The temperature detection circuit protects the circuit section from overheating. If the temperature in the section rises more than a certain number of degrees, the circuit sends an interrupt to the CPU on the main board.

Circuit Block Diagram of the Video Board

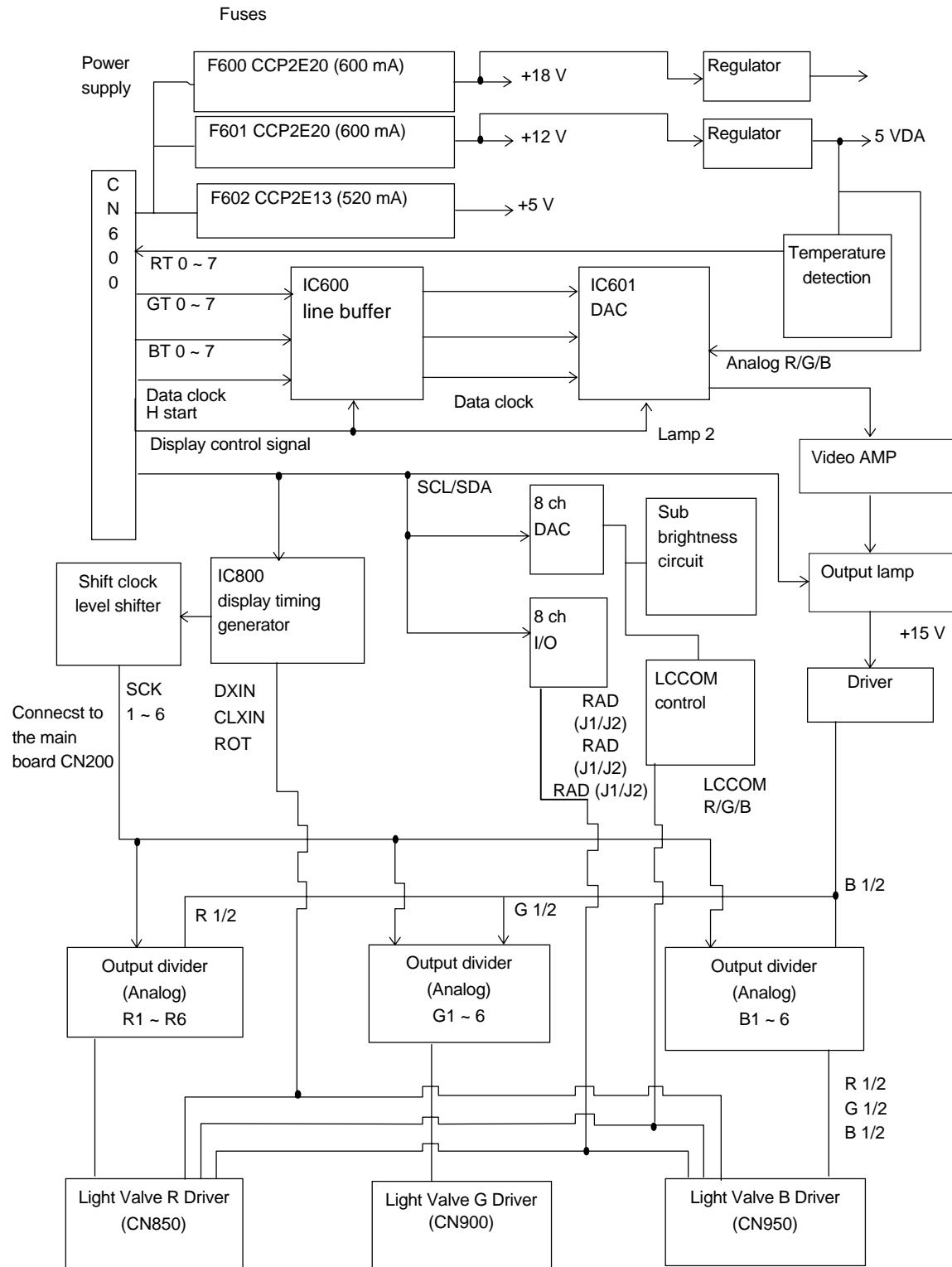


Figure 2-11.

2.5 INTERFACE BOARD UNIT

This unit consists of two boards (IB1 and IB2) with interfaces that can be connected to external devices (the host computer, external speaker, and video device). The unit involves the input/output interface connector and the noise filter circuit.

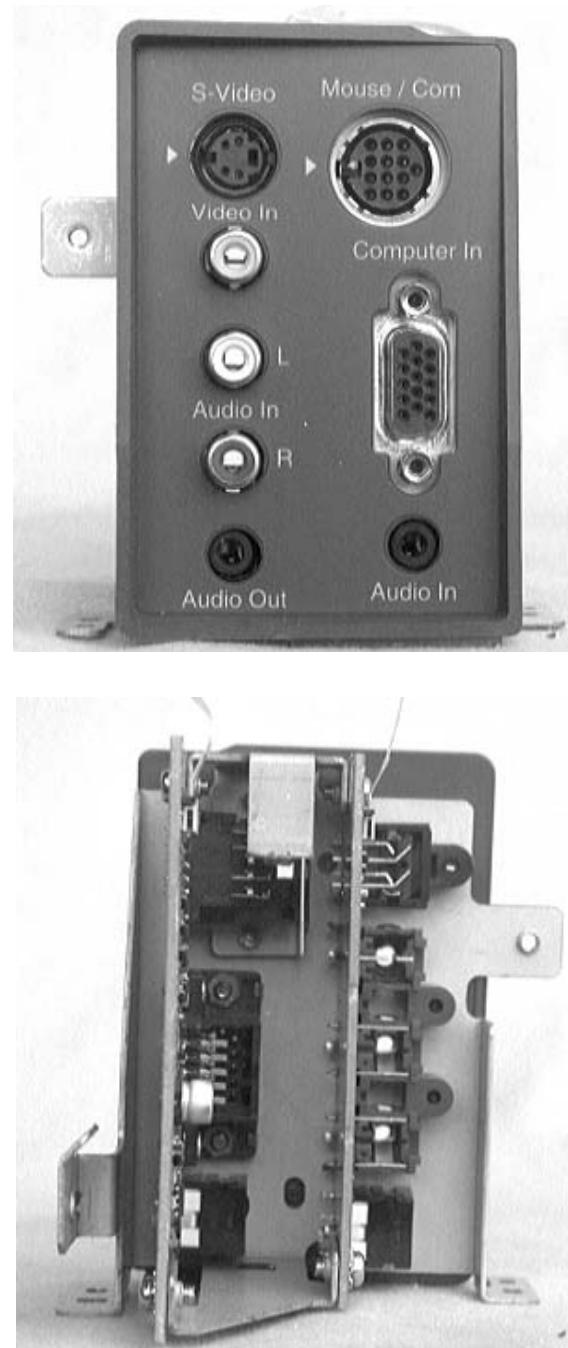
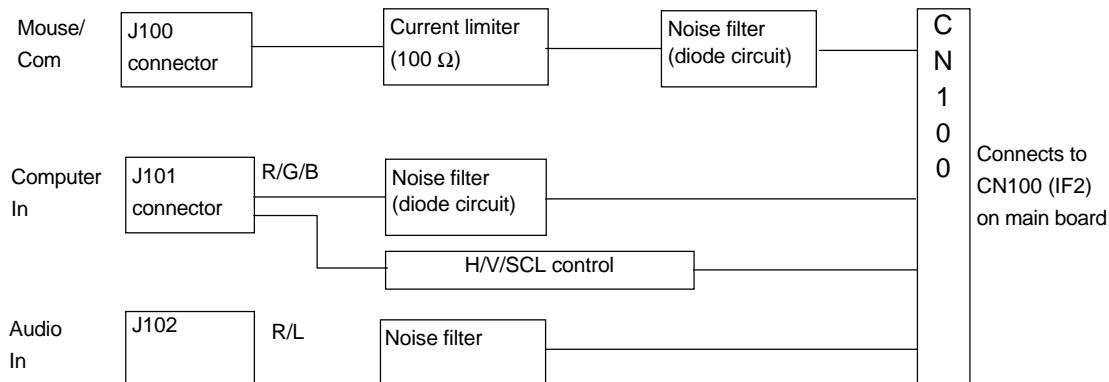


Figure 2-12.

Interface board (IB2)**Figure 2-13.****Interface board (IB1)****Figure 2-14.**

2.6 CONTROL PANEL

The board on this panel contains eight buttons and six LEDs. It is connected to CN504 on the main board.

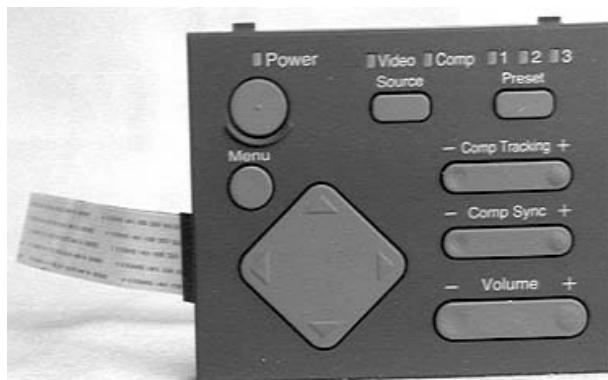


Figure 2-15.

2.7 RECEPTOR BOARD

A detector mounted on the receptor board senses the infrared signals from the remote control. The receptor board is attached to the power supply unit and placed in the front of the unit. Control of any signals received by the receptor board is transferred to the CPU as interrupt signals.

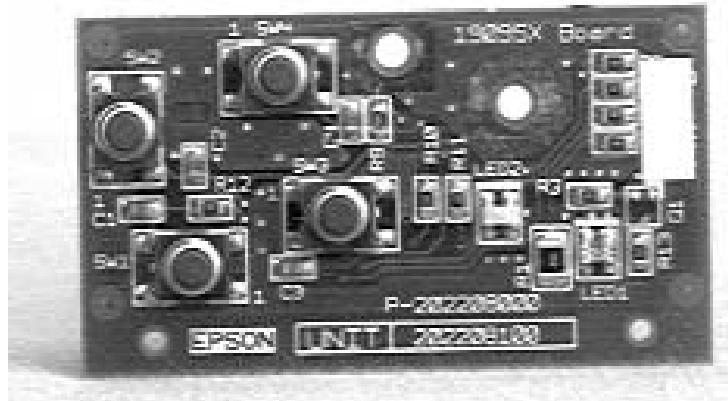


Figure 2-16.

2.8 SPEAKER UNIT

Inside the upper case is a speaker. Audio signals from the amplitude circuit on the video board are output to this speaker. Also, audio signals are available from externally connected speakers. In this case, balance between internal and external speakers is adjustable using the fade function.

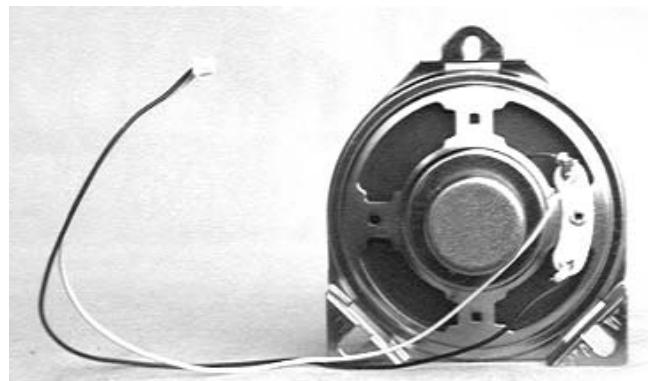


Figure 2-17.

2.9 LIGHT GUIDE BLOCK

The light valve block eliminates ultraviolet rays harmful to the light valves and makes the light intensity from the light source lamp uniform before dividing it into 3 light outputs (R/G/B). Lenses and mirrors built in the block disperse the light. The drawings below show the appearance and an internal block diagram of the light valve block.

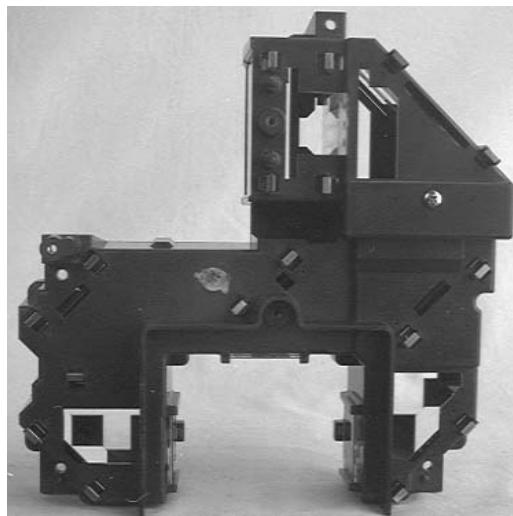


Figure 2-18.

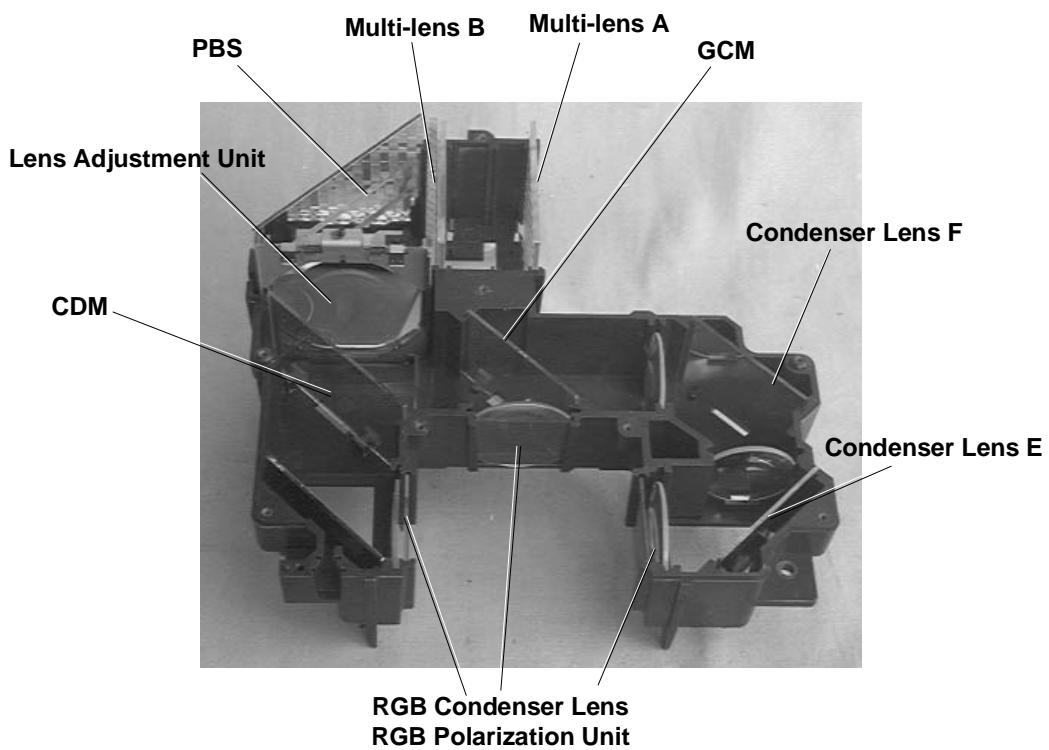


Figure 2-19.

A/B Multi-lens

Dispersion of light from the light source lamp through the A/B multi-lens makes brightness roughly uniform. A UV filter coats the surface of the multi-lens array to eliminate ultraviolet rays.

PBS (Polarizing Beam Splitter)

Light dispersed through the A/B multi-lens is further dispersed through the PBS to make the light intensity uniform.

Lens Adjustment Unit

Adjusts the distortion of light applied through the A/B multi-lens, the polarizing beam splitter, and the CDM (see definition below).

CDM

The CDM is a light filter that looks red in visual light. The CDM (A) filter transmits only red light and reflects blue and green lights from the light source.

GDM

The GDM is a light filter that looks blue in visual light. The GDM filter transmits only blue light from the light source. The light input to the GDM is only blue and green light reflected by the CDM, as described above, and green light is reflected by the GDM and provided to the G condenser lens.

D/E Condenser Lens

The D/E condenser lens collects the light dispersed by the GDM to prevent reduction and provide light to the mirror at the next stage.

R/G/B Condenser Lens

Collects the light divided into R, G, and B.

R/G/B Polarization Unit

Controls the color of lights dispersed into red/blue/green by the CDM and GDM. Films in the colors shown below are placed on each sheet of the polarization unit.

Table 2-8.

NAME	COLOR OF FILM
POLARIZATION R	GRAY
POLARIZATION G	BLUE
POLARIZATION B	RED

2.10 R/G/B LIGHT VALVES TO PRISM UNIT

2.10.1 R/G/B LIGHT VALVES

The R/G/B light valves are each high-density, liquid crystal panels of 307,200 pixels (liquid crystal shutters) of 1.1" (W) x 0.8" (H) (26.9 x 20.2 mm). The condition of the twist level in the liquid crystal shutter can be controlled in units of 8 degrees from a fully closed condition (no light transmission) to a fully open condition (no light blocked). Combining the three light valves (R/G/B) enables projection in full color (approximately 16,700,000 colors). Each light valve has its own part number and is incompatible with the others. Consequently, their part numbers differ, as summarized in the table below.

Table 2-9.

NAME	PART NO.	REMARKS
LIGHT VALVE G	1021660 (1028151) *1	Light valve G does not have a position adjust plate.
LIGHT VALVE B	1022063 (1027966) *1	Light valve B has a blue label on the FPC cable.
LIGHT VALVE R	1021674 (1027964) *1	Light valve R has a red label on the FPC cable.

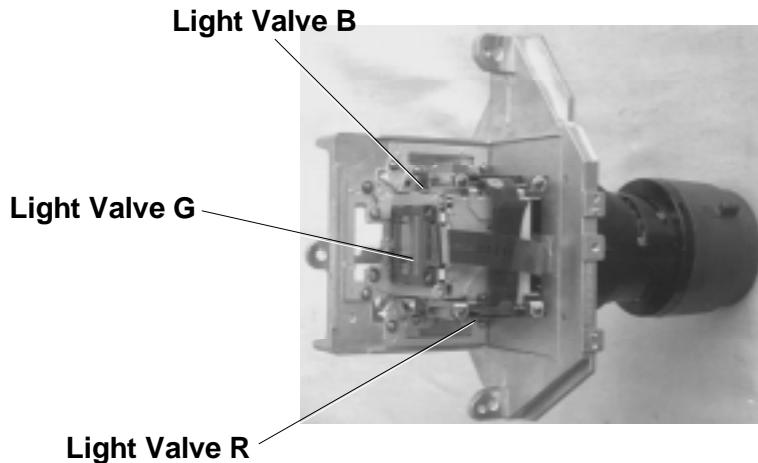


Figure 2-20.

Since the light valves are liquid crystal shutters, they have specific features, depending on the ambient temperature. At low temperatures, reaction speed is fast. After-image, light contrast, or thinner color may occur. At high temperatures, reaction speed is activated. The whole image seems dark.

2.10.2 PRISM UNIT

The prism unit creates the three lights, which are transmitted through the light valve.

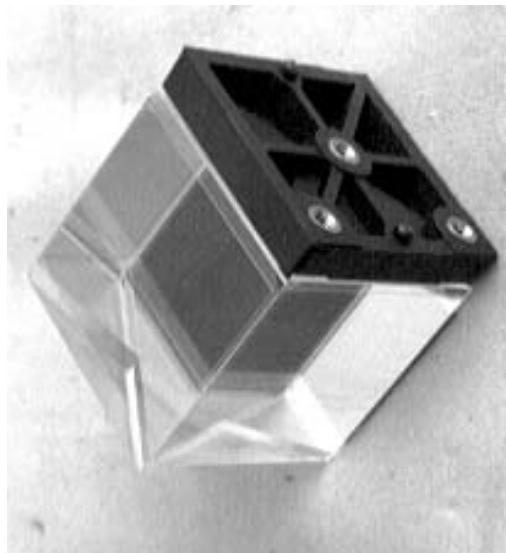


Figure 2-21.

2.11 PROJECTOR LENS

The projector lens unit has a zoom function (*1.4) and focus adjustment function.

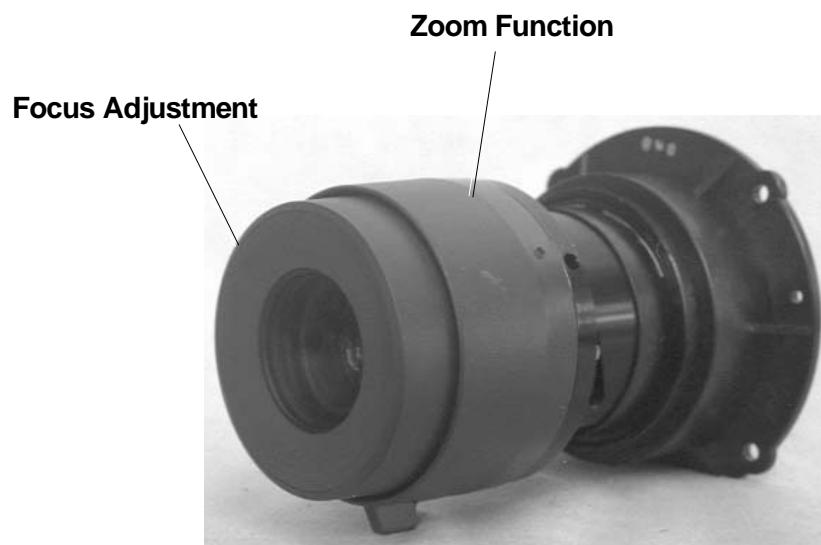


Figure 2-22.

2.12 LAMP HOUSING

The lamp housing consists of the light source valve and connector for the power supply unit.

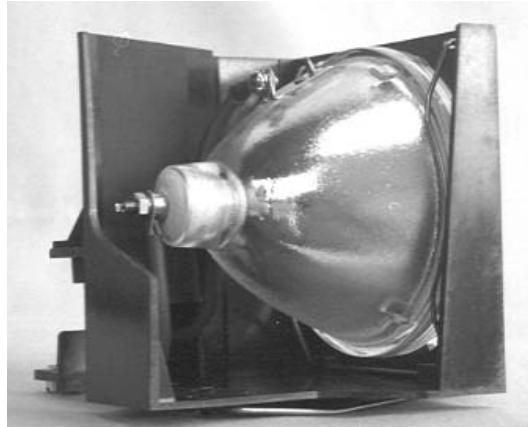


Figure 2-23.

- * The life expectancy of the light source valve is 4000 hours. When operating time exceeds 4000 hours, the lamp indicator on the control panel blinks automatically. If you encounter this condition, replace the light source valve as soon as possible.
- * The safety switch on the lamp outer housing, beside the lamp housing, detects overheating. If the temperature exceeds the safety zone because of abnormal lamp conditions, this switch shuts down the power.

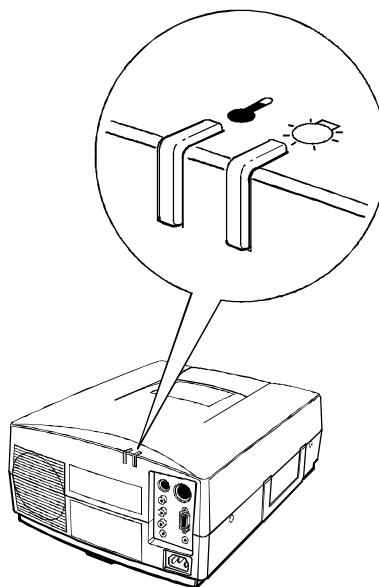


Figure 2-24.

Table 2-10.

Warning Light	Color	Status
Temp	Red	Projector is hot.
Lamp	Red	Lamp needs to be replaced.
Temp and Lamp	Flashing Red	Projector problem. Try turning off and back on first. Then see Chapter 4.

3.1 DISASSEMBLY AND ASSEMBLY PROCEDURES

This section explains how to disassemble the ELP-3500. The assembly procedure is the exact reverse of the disassembly procedure.

Preparation

1. Remove any rings, wrist watch, cuff links, or other metal accessories likely to come into contact with the equipment.
2. Wear gloves.
3. Wear a wrist band and ground it. Place a ground mat under the unit.
4. Turn off the main unit and the host computer.
5. Unplug the power cord from the main unit and service outlet.
6. Disconnect the interface cable from the main unit.
7. Clean the air filter, interface, and case cover with a vacuum cleaner.

Required Tools and Accessories

Prepare the tools and accessories listed in the table below.

Table 3-1. Required Tools

Name	Quantity	Supplier	Use
Phillips screwdriver 2	1	Commercial	Disassembly of the case and interior
Flat blade (-) screwdriver	1	Commercial	Removal of power connector for light
Tweezers	1	Commercial	To unlock the FPC connector on the driver board
Phillips screwdriver 1	1	Commercial	Removal of the optical unit
Open wrench (8 mm)	1	Commercial	Removal of the foot adjuster
Set wrench (1.27 mm)	1	EPSON	Focus alignment (optical unit)
Brush	1	Commercial	To brush off the dust around fan
Vacuum cleaner	1	Commercial	To clean the optical unit and filter
Paper wiper	Some	Commercial	To clean the projector lens
Air blower	1	Commercial	To clean the optical unit
Glove	1	Commercial	To avoid cuts
Wrist band, ground map	1	Commercial	To avoid electrostatic effects

Precautions

Read the precautions given in individual assembly and disassembly procedures carefully before starting the procedure. General precautions are given below.

When you disassemble the projector main unit, be careful of dust sticking to internal fans and air filters because it can migrate and contaminate the optical unit, which is the heart of the display mechanism, causing display quality to deteriorate. The optical unit is also highly sensitive to static electricity.

The speaker unit contains a permanent magnet. Keep it away from electromagnetic media such as diskettes and magnetic cards.

Handle the projector lens and light guide units with care as they are highly susceptible to vibration and shock.

Do not try to disassemble any part (for example, the power supply unit) not covered in this manual.

Operations that Require Adjustments and Checks

When you perform one of the removal or replacement operations in the table below, you need to perform the checks and adjustments explained in Chapters 5. Perform necessary adjustments and checks before reinstalling the upper case unit.

Table 3-2.

Operation	Adjustment and check item
Driver board replacement	Check the 16 grayscale levels
Flash ROM replacement	Flicker/Ghost/Sub-contrast adjustments
Optical unit replacement	Check and adjust focus alignment Flicker/Ghost/Sub-contrast adjustments

3.2 Projector Main Unit Disassembly and Assembly

The flowchart for disassembling the projector main unit is shown below. You can reassemble dismantled projector parts by reversing the order of disassembly. Therefore, unless specifically specified, this manual contains no assembly procedures. Detailed descriptions of disassembly procedures are given in sections 3.2.1 through 3.2.18.

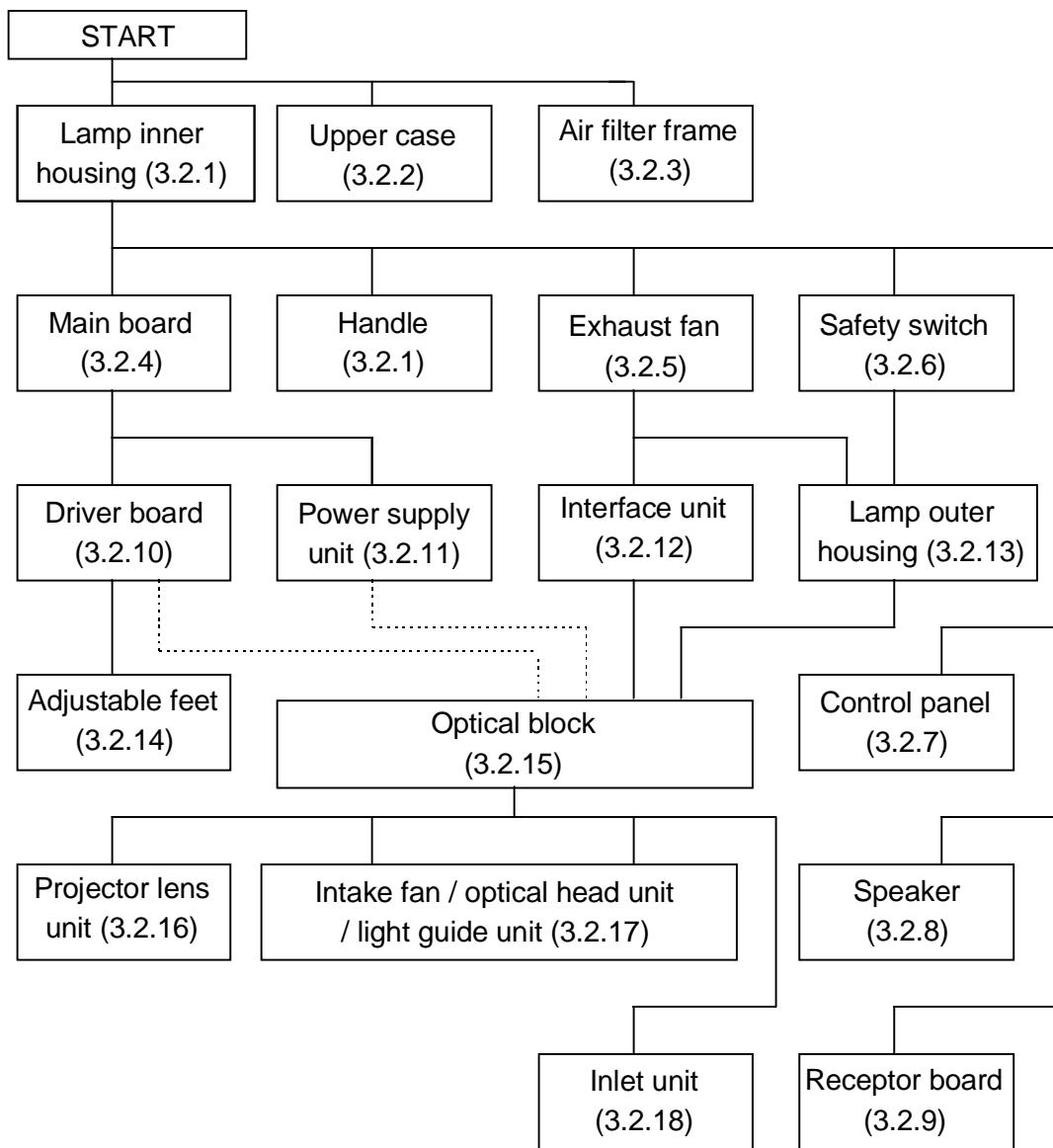


Figure 3-1.

3.2.1 Removing the Lamp Inner Housing

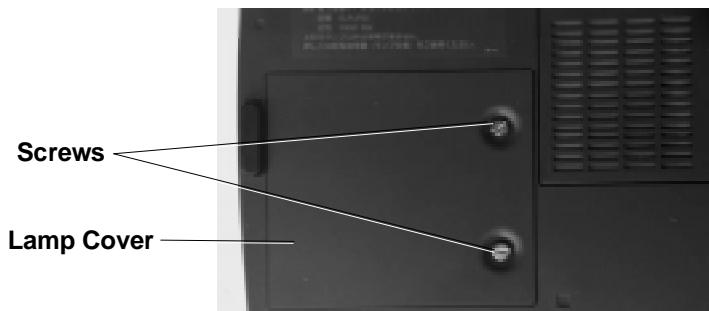


Figure 3-2.

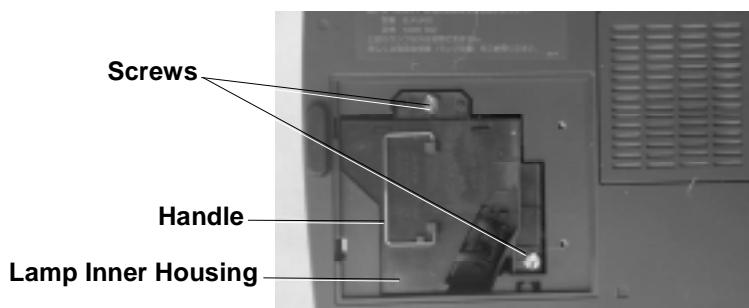


Figure 3-3.

1. Remove the lamp cover mounting screws from the main unit bottom plate and remove the lamp cover.
Screws: M4x7.5 F/Ni: P/N 1021771
Mounting torque: 4.5 kg cm = 3.9 lb inch
2. Remove 2 lamp mounting screws from the inner housing.
Screws: M4x7.5 F/Ni: P/N 1021771
Mounting torque: 4.5 kg cm = 3.9 lb inch
3. Pull up the handle on the lamp inner housing and remove the lamp unit.

Warning:

1. The lamp unit is very hot immediately after use and may burn you if handled carelessly. Before removing the lamp unit, make sure the temperature of the lamp inner housing unit has cooled down.
2. When installing the lamp unit, take care not to touch the lamp's reflector with your hands (to prevent the reflector from being contaminated).

3.2.2 Removing the Upper Case Unit and Handle

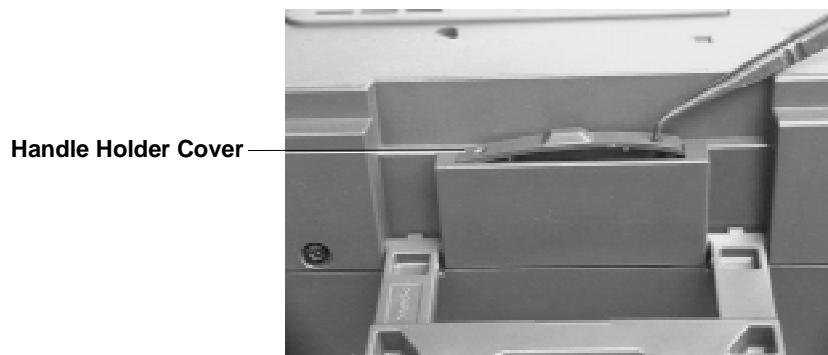


Figure 3-4.

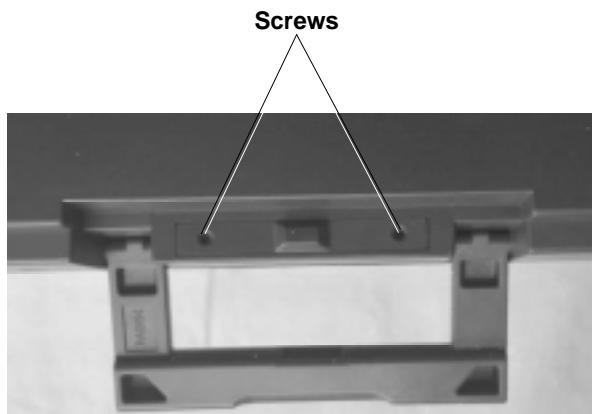


Figure 3-5.

1. Pull the handle up. Insert the spring hook into either hole in the handle holder cover and, while pressing the spring hook toward the hole on the opposite side, pull it up to remove the handle. Bend the center of the handle holder cover up, forming an arch.
2. Remove 2 screws beneath the handle holder cover.
Screws: +M3x12 F/Zn P-Tight: P/N 1021823
Mounting torque: 6.0 kg cm = 5.2 lb inch
3. Remove 4 case unit fixing screws on both sides.
Screws: +M4x8 F/ZB Bind: P/N 1033026
Mounting torque: 6.0 kg cm = 5.2 lb inch

Caution:

The handle holder cover has claws on both ends. They may be damaged if you insert the spring into a hook's hole and simply pulling it up.

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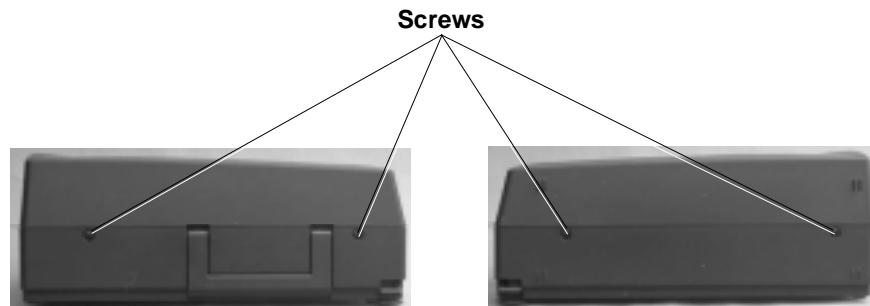


Figure 3-6.

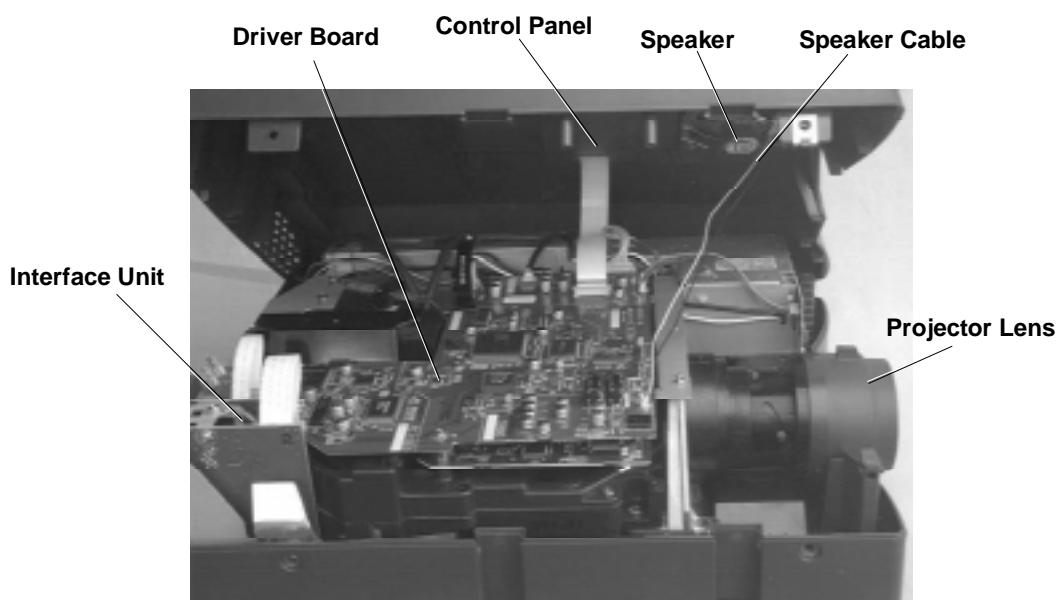


Figure 3-7.

4. Hold the left and right sides (handle and fan guard sides) of the upper case unit and lightly pull the handle straight up.
5. Disconnect the speaker cable from connector CN400 on the main board
6. Unlock connector CN504 on the main board before disconnecting the control panel cable from it.
7. Remove the upper case.
8. Remove the handle out of the lower case unit.

3.2.3 Removing the Air Filter Frame

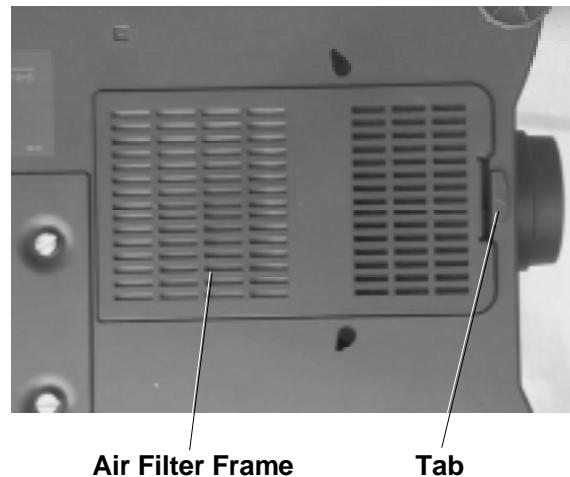


Figure 3-8.

1. Push the tab on the air filter frame. Then lift it up.

3.2.4 Removing the Main Board Block

Prerequisite: Complete the steps explained in Section 3.2.2.

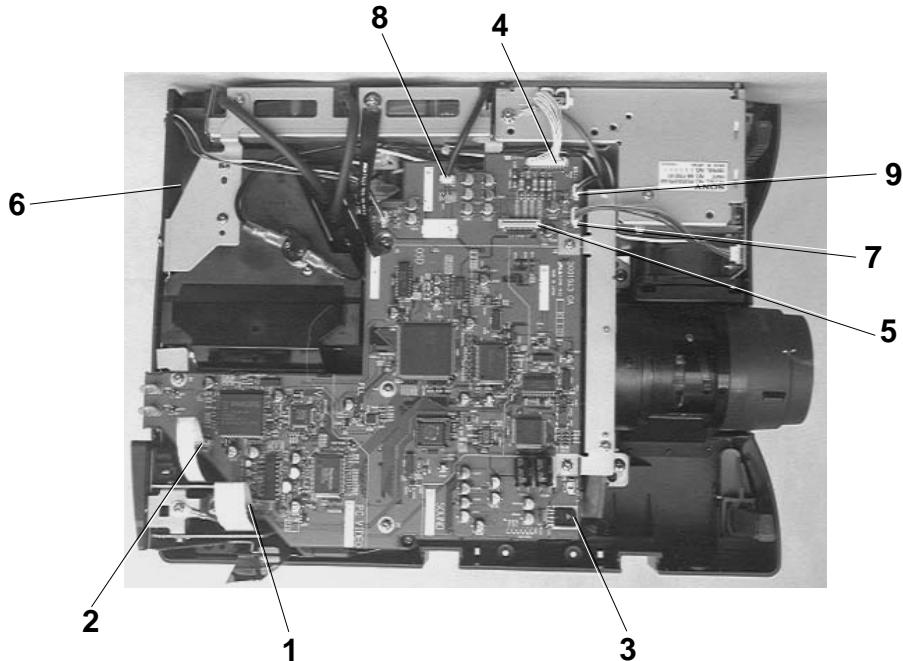


Figure 3-9.

1. Remove 7 wire cables and 2 FPC cables from the main board block. The cables are summarized in the table below.

Number	Connector	Function and Remarks
1	CN100	Interface unit
2	CN101	Interface unit
3	CN400	Speaker unit *
4	CN501	Power supply unit
5	CN502	Intake fan
6	CN503	Exhaust fan
7	CN504	Control panel *
8	CN505	Power supply unit
9	CN600	Receptor board

* Removed in Section 3.2.1

Caution:

Before disconnecting the FPC cable from connectors CN100 and CN101 (1 and 2), gently pull each connector straight up to unlock it.

(Continued from previous page)



Figure 3-10.

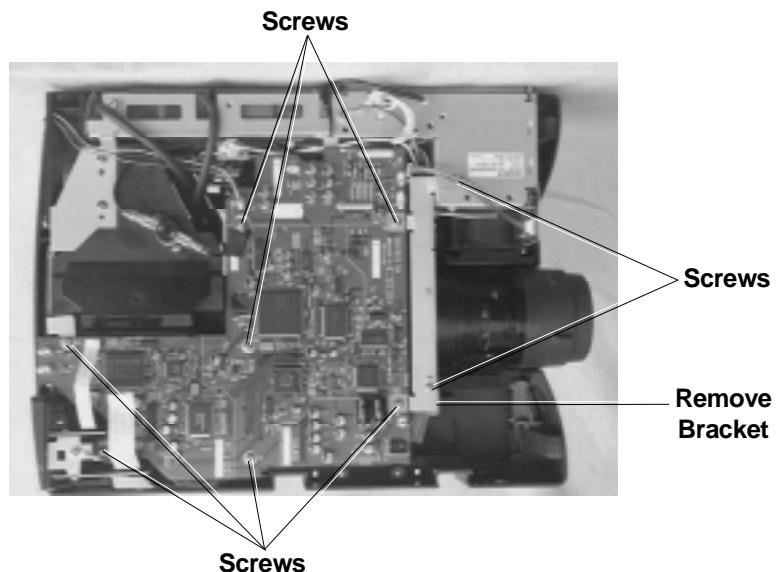


Figure 3-11.

2. Remove the screw mounting the FG strap on the power supply unit.

Screw: +M3x6 F/Ni Sems P/N 1033025

Mounting torque: 6.0 kg cm = 5.2 lb inch

3. Remove 7 mounting screws from the main board block (one of the screws mounts the FG strap also).
6 Screws: +M3x6 F/Ni: Sems P/N 1033122
Mounting torque: 6.0 kg cm = 5.2 lb inch
1 Screw: +M3x12 F/Zn: Bind P Tight P/N 1021823
Mounting torque: 6.0 kg cm = 5.2 lb inch
4. Grasp the main board block on the left side (the portion indicated by the arrow in the photo) and disconnect the connector from the interface board assembly.

Caution

To avoid malfunctions caused by wire breaking or solder flaking, never apply any mechanical stress to the board.

3.2.5 Removing the Exhaust Fan Unit

Prerequisite: Complete the steps explained in Section 3.2.1.

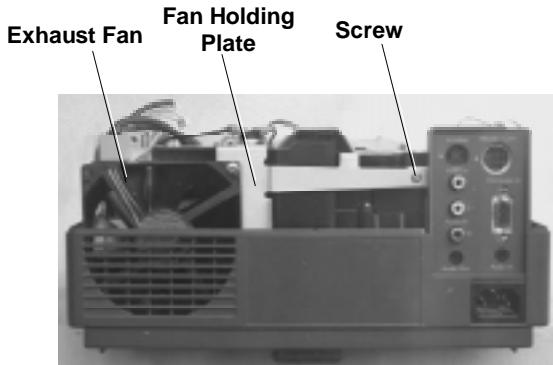


Figure 3-12.

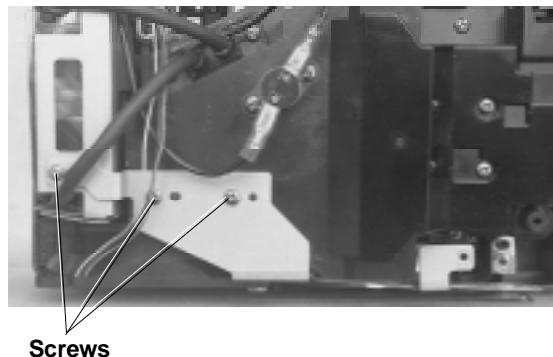


Figure 3-13.

1. Disconnect the cable connected to CN503.
2. Remove 4 screws from the fan holding plate to detach the fan and holding plate.
Screws: +M3x8 F/Zn: P Tight P/N 1021824
Mounting torque: 6.0 kg cm = 5.2 lb inch
Screws: +M3x6 F/Ni: P/N 1033122. Mounting torque: 6.0 kg cm = 5.2 lb inch
3. Remove 2 screws mounting the exhaust fan and separate the fan and holding plate.
Screws: +M4x10 F/Zn Bind: P/N 1022793
Mounting torque: 6.0 kg cm = 5.2 lb inch

Caution:

1. When installing the exhaust fan, use care with its orientation. Installing the fan in the reverse orientation may result in a device failure or extended cooling time because of overheating. Make sure the label on the fan faces out.
2. The exhaust fan unit and its peripherals are susceptible to dust and dirt. When installing the exhaust fan unit, check it for dirt and clean it if necessary.

3.2.6 Removing the Safety Switch

Prerequisite: Complete the steps explained in Section 3.2.1.

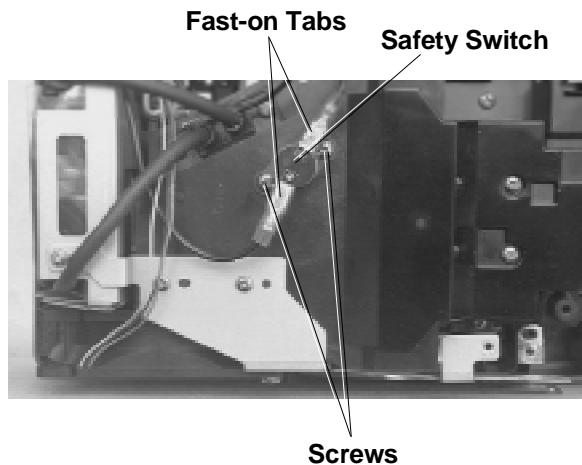


Figure 3-14.

1. Disconnect the Fast-on tab terminals for the 2 cables connected to the safety switch.
2. Remove 2 mounting screws from the safety switch and detach the safety switch.

Screws: +M3x8 F/Zn: P-Tight P/N 1021824

Mounting torque: 6.0 kg cm = 5.2 lb inch

Caution:

When removing the Fast-on terminals, do not apply excessive force to the terminals on the safety switch in the horizontal or vertical direction.

- * The polarity of the cables (blue/white) is not significant; connect them to any terminals on the safety switch.

3.2.7 Removing the Control Panel

Prerequisite: Complete the steps explained in Section 3.2.1.

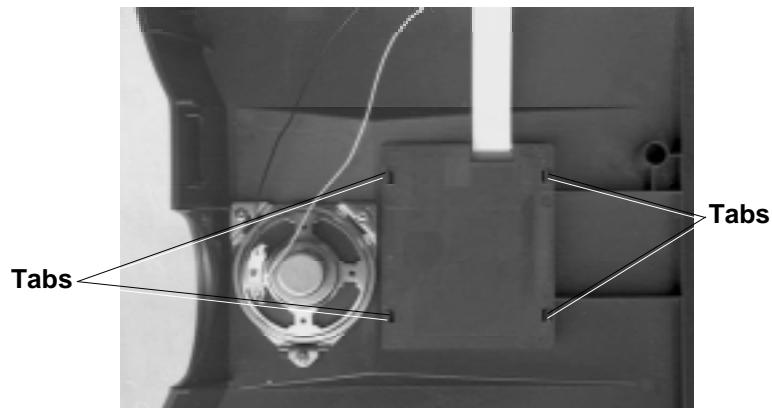


Figure 3-15.

1. Pull down the tabs from inside. Then remove the control panel on the upper case.

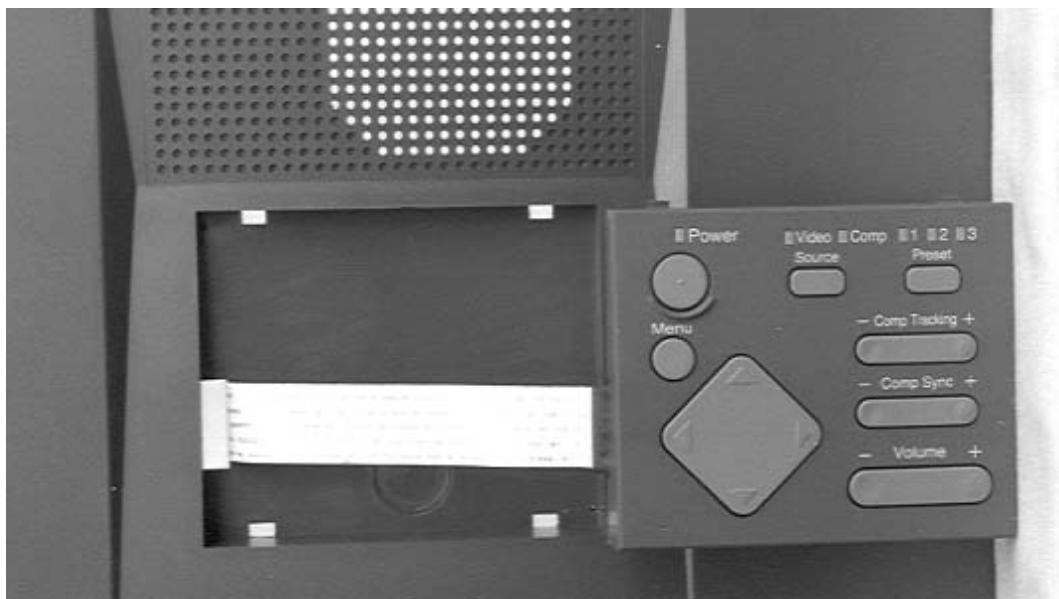


Figure 3-16.

3.2.8 Removing the Speaker Units

Prerequisite: Complete the steps explained in Section 3.2.1.

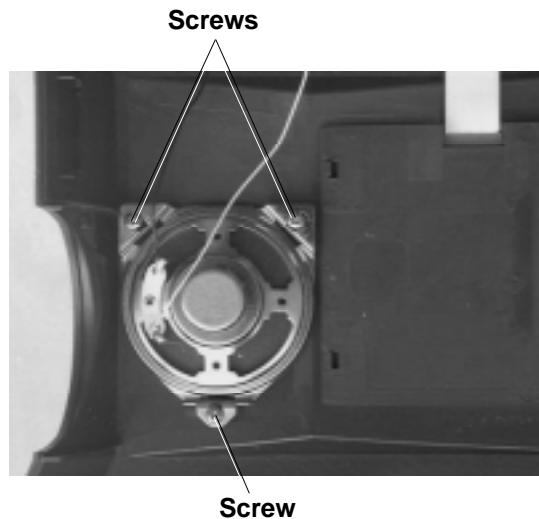


Figure 3-17.

1. Remove 3 screws mounting the speaker unit and remove the speaker along with the bracket.

Screws: +M3x8 F/Zn: P-Tight P/N 1021824

Mounting torque: 6.0 kg cm = 5.2 lb inch

Caution:

1. The speaker unit contains a permanent magnet. Keep it away from electromagnetic media such as diskettes and magnetic cards.
2. When mounting a speaker, align the 3 screw holes in the speaker with those in the frame; then tighten the screws with same tightening torque.

3.2.9 Removing the Receptor Board Assembly

Prerequisite: Complete the steps explained in Section 3.2.1.

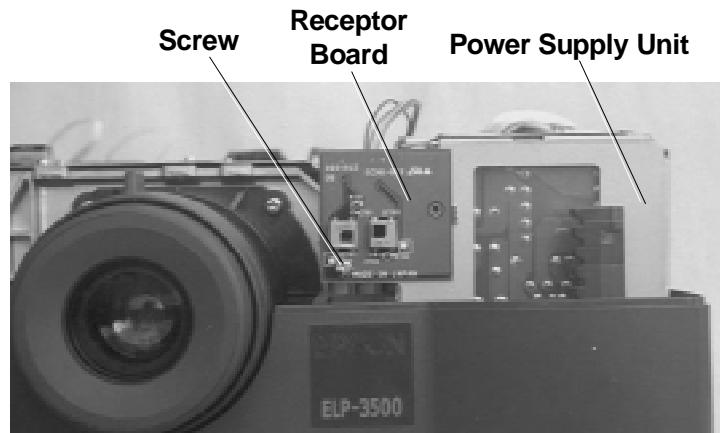


Figure 3-18.

1. Remove the screw mounting the receptor to the power supply unit.
Screw: +M3x6 F/Ni: P/N 1033122
Mounting torque: 4.5 kg cm = 3.9 lb inch
2. Disconnect the cable from CN600 on the driver board block, and remove the receptor board assembly.

Caution:

When installing the receptor board assembly, align the hole in the board with the boss on the power supply unit before tightening the screw.

3.2.10 Removing the Driver Board Assembly

Prerequisite: Complete the steps explained in sections 3.2.1 and 3.2.4.

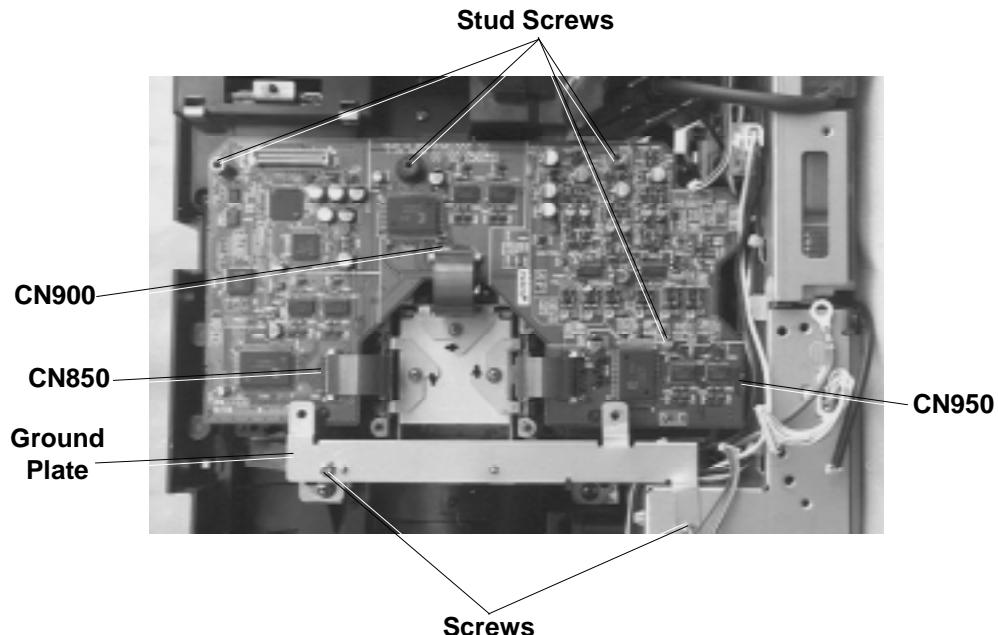


Figure 3-19.

1. (Although the illustration above shows 2 GND plate mounting screws and the GND plate, those parts are actually removed in step 2 of Section 3.2.4, on page 3-9.)
2. Unlock the connector locks for CN850, CN900, and CN950 to disconnect the light bulb FPC cable.
3. Remove 4 driver board assembly mounting hex. stud screws.
4. Hold both edges of the driver board assembly and pull it straight up.

3.2.11 Removing the Power Supply Unit

Prerequisite: Complete the steps explained in sections 3.2.1 and 3.2.4.

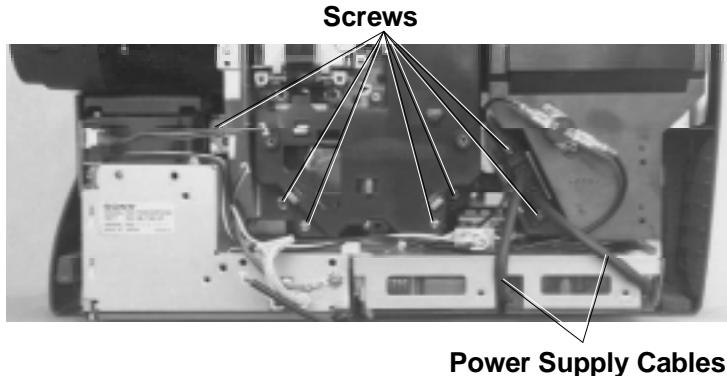


Figure 3-20.

1. Remove 2 lamp power supply cables connected with the lamp's inner housing unit screws.

Screws: +M3x8 F/Zn: P-Tight P/N 1021824

Mounting torque: 6.0 kg cm = 5.2 lb inch

2. Disconnect the cables (blue/white) from the safety switch.

3. Remove 4 mounting screws from the power supply unit.

Screws: +M3x8 F/Zn: P/N 1021824

Mounting torque: 6.0 kg cm = 5.2 lb inch

4. Remove the ground cable mounting screw.

Screw: +M4x6 F/Ni: P/N 1033025

Mounting torque: 6.0 kg cm = 5.2 lb inch

5. Pull the power supply unit straight up with the inlet cover.

Caution:

When removing the power supply unit, take care not to bend or damage the bosses on the lower case unit. When installing the power supply unit, align the power supply unit by positioning holes with these bosses. The intake fan and its peripheral parts in the power supply unit are susceptible to dust and dirt. When installing the power supply unit, check the fan's cleanliness and clean it if necessary.

3.2.12 Removing the Interface Unit Assembly

Prerequisite: Complete the steps explained in sections 3.2.1 and 3.2.4.

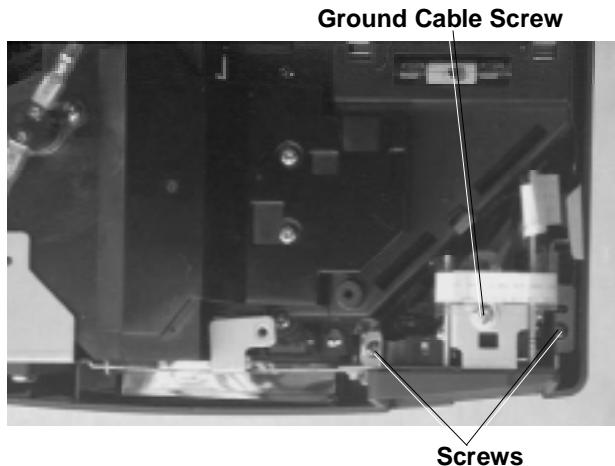


Figure 3-21.

1. Remove the GND cable mounting screw.

Screw: +M3x6 F/Ni: P/N 1033122

Mounting torque: 6.0 kg cm = 5.2 lb inch

2. Remove 2 interface unit assembly mounting screws.

Screws: +M3x8 F/Zn P-Tight: P/N1021824

Mounting torque: 6.0 kg cm = 5.2 lb inch

3. Remove the fan holding plate mounting screw.

Screw: +M3x6 F/Ni : P/N1033122

Mounting torque: 6.0 kg cm = 5.2 lb inch

4. Slide the interface unit slightly inward so it does not contact the frame, before removing it.

Caution:

When installing the interface board assembly, align the 2 positioning holes (beside the screw holes) in the board with the bosses on the bracket before tightening the screws.

3.2.13 Removing the Lamp Outer Housing Unit

Prerequisite: Complete the steps explained in sections 3.2.1 and 3.2.6.

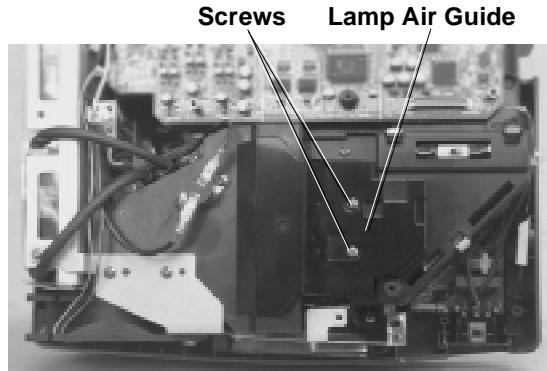


Figure 3-22.

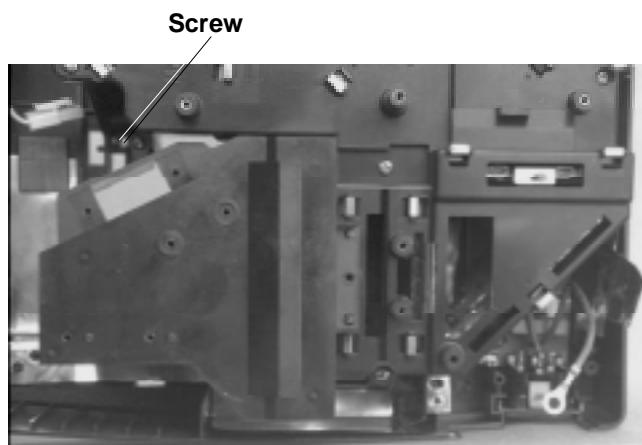


Figure 3-23.

1. Remove 2 lamp air guide mounting screws to detach the lamp air guide.
Screws: +M3x8 F/Zn P-Tight: P/N 1021824
Mounting torque: 6.0 kg cm = 5.2 lb inch
2. Remove the lamp outer housing unit mounting screws and remove the lamp outer housing unit.
Screws: +M3x8 F/Zn: P/N 1021824
Mounting torque: 6.0 kg cm = 5.2 lb inch

Caution:

The interior of the lamp outer housing is susceptible to dust, if necessary, clean it before reinstalling it. The lamp outer housing remains hot for a while after power is turned off. Remove the housing after it cools down completely.

3.2.14 Removing the Adjustable Foot Unit

Prerequisite: Complete the steps explained in sections 3.2.1, 3.2.4, 3.2.10, and 3.2.11.

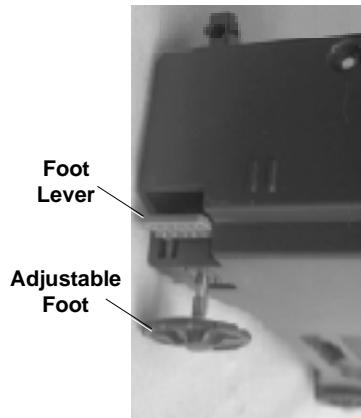


Figure 3-24.

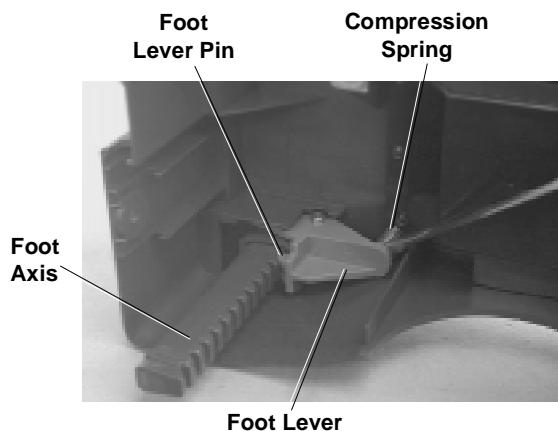


Figure 3-25.

1. Turn the adjustable foot counterclockwise about 40 times to remove it.
2. While pressing the foot lever, pull the foot axis upward to remove it.
3. Slide the upper side (foot lever side) of the compression spring to remove it.
4. Remove the foot lever pin then remove the foot lever

Caution:

When installing or removing the adjustable foot unit, do not fold or peel the foot seal on the lower case. Insert the foot lever, then replace the counter spring, and finally insert the foot axis. When installation is complete, press the foot lever to check whether it makes a strange noise. If it makes noise, adjust the compression spring to change the contact point with the foot lever to eliminate the noise.

3.2.15 Removing the Optical Block

Prerequisite: Complete the steps explained in sections 3.2.1, 3.2.4, 3.2.5, 3.2.10, 3.2.11, 3.2.12, and 3.2.13.

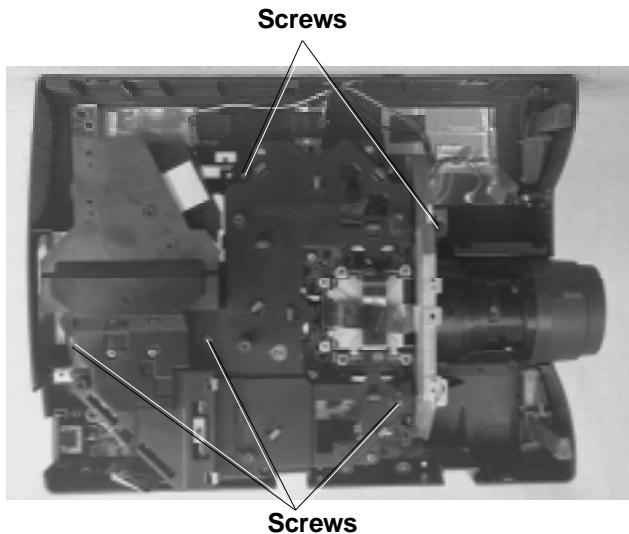


Figure 3-26.

1. Remove 4 optical block mounting screws.
Screws: +Mx14 F/Zn Bind P Tight: P/N 1021825
Mounting torque: 6.0 kg cm = 5.2 lb inch
2. Pull the optical block straight up from the lower case.

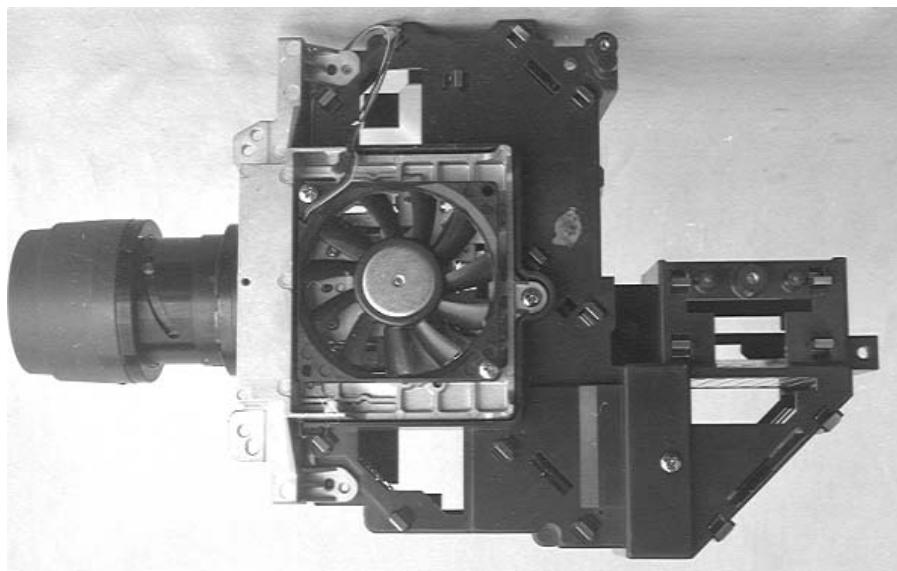


Figure 3-27.

3.2.16 Removing the Projector Lens Unit (PLU)

Prerequisite: Complete the steps explained in sections 3.2.1, 3.2.4, 3.2.5, 3.2.10, 3.2.11, 3.2.12, 3.2.13, and 3.2.15.

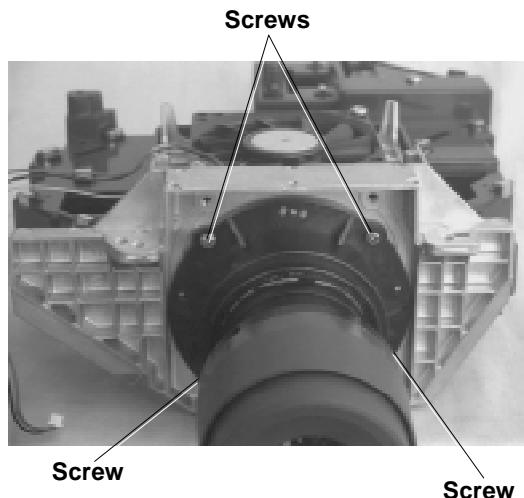


Figure 3-28.

1. Remove 4 screws securing the projector lens unit (PLU) and remove the projector lens unit.

Screws: +M4x6 F/Zn: P/N 1004532

Mounting torque: 6.0 kg cm = 5.2 lb inch

Caution:

1. When installing the projector lens unit, align the 2 bosses on the frame with the positioning holes before tightening the screws. Tighten the screws with a torque of 6.0 kg. Do not make the screws too tight (too great a mounting torque may damage the projector lens unit).
2. Take care not to touch the lens surface or prism of the projector lens unit with your hands (to prevent their surface from being contaminated).

3.2.17 Removing the Intake Fan / Optical Head Unit / Light Guide Unit

Prerequisite: Complete the steps explained in sections 3.2.1, 3.2.4, 3.2.5, 3.2.10, 3.2.11, 3.2.12, 3.2.13, and 3.2.15.



Figure 3-29.

Intake fan

1. Remove 2 intake fan mounting screws and remove the intake fan.

Screws: +M4x20 F/Zn S2W1: P/N 1032848

Mounting torque: 6.0 kg cm = 5.2 lb inch

Caution:

When installing the intake fan, place it label-side down (on the aluminum die-cast side) and so that its cable is oriented as shown in the photo on the next page. Clean the intake fan until it is free of dust and dirt.

Optical Head Unit/Light Guide Unit

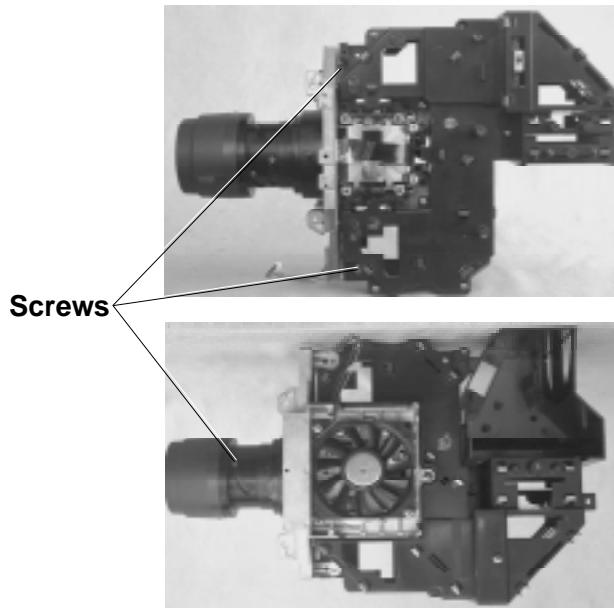


Figure 3-30.

1. Remove the mounting screw on the bottom of the optical head unit.
Screw: +M4x8 F/Zn: P/N 1024565
Mounting torque: 6.0 kg cm = 5.2 lb inch
1. Remove 2 mounting screws on the top of the optical head unit before pulling the light guide unit up straight and separating it from the optical head unit.
Screws: +M4x10 F/Zn: P/N 1022793
Mounting torque: 6.0 kg cm = 5.2 lb inch

Caution:

Do not touch the 3 light valve screens on the light guide unit with your hands, and do not bend the FPC cable. When installing the light guide unit on the optical head unit, align the 2 bosses (beside the screws for the light guide unit) to the holes in the optical head unit before tightening the screws. The optical head mounting screw (M4x8) on the bottom of the unit is different in length from the mounting screw (M4x10) on the top. Check screw size before mounting them.

3.2.18 Removing the Inlet Unit

Prerequisite: Complete the step explained in sections 3.2.1, 3.2.4, 3.2.5, 3.2.10, 3.2.11, 3.2.12, 3.2.13, and 3.2.15.

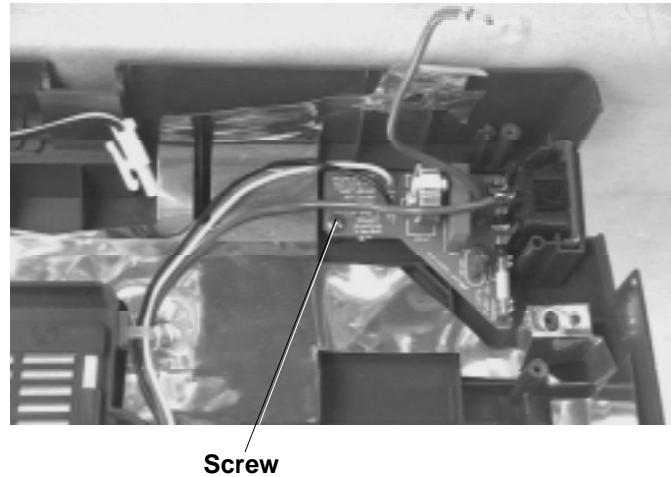


Figure 3-31.

1. Remove the inlet unit mounting screw.
Screw: +M3x8 F/Zn P-Tight: P/N 1021824
Mounting torque: 6.0 kg cm = 5.2 lb inch
2. Remove the cable wire from 4 clamps.
3. Pull up the board section of the inlet unit to remove the unit.

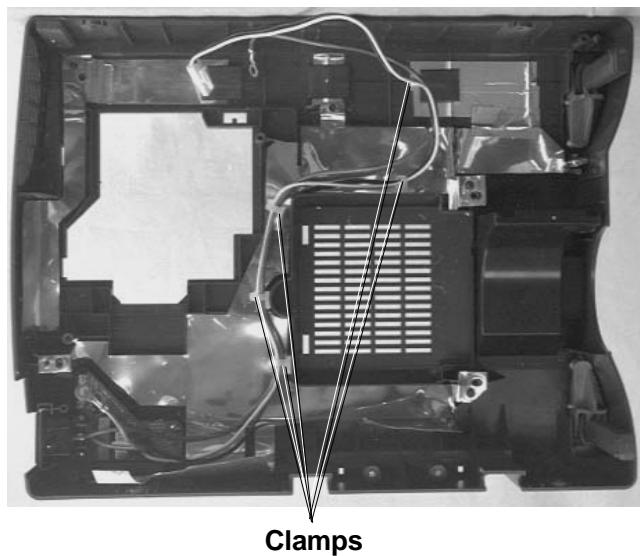


Figure 3-32.

3.3 Disassembling and Assembling the Remote Control Unit

The whole remote control unit is handled as a service part; its components are not designated as service parts. So, disassemble the remote control unit only to clean its trackball or buttons.

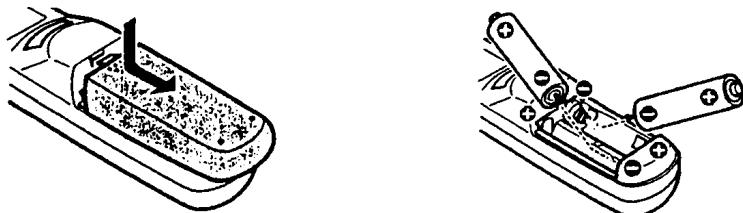


Figure 3-33.

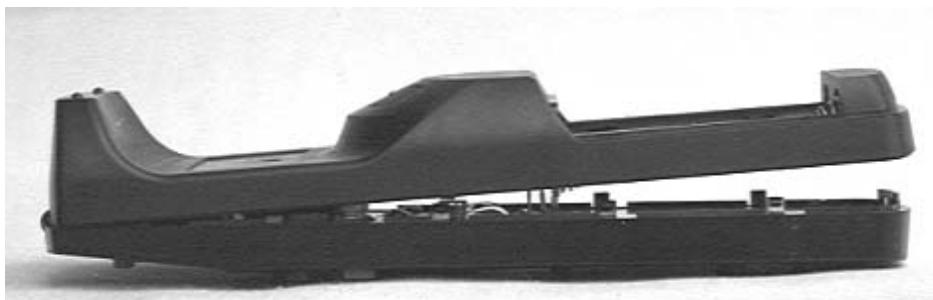


Figure 3-34.

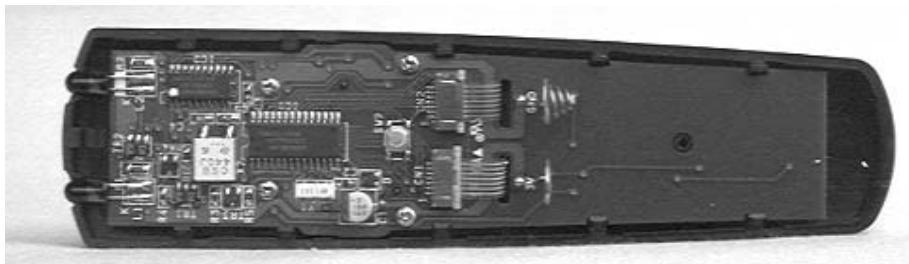


Figure 3-35.

1. Remove the battery cover from the rear panel, and remove 2 battery cells.
2. Remove 1 screw behind the battery holder.
3. While pushing up the rear cover, push the 4 hooks for the battery block in to unlock the cover.
4. Bend the rear cover right and left to unlock the 6 hooks before removing the cover.
5. Remove 4 fixing screws to detach the board.

4.1 Before Starting Troubleshooting Procedures

1. Before you replace a unit or block, double-check that it is actually defective. (For example, check that cables are connected properly.)
2. Find the points you want to check by examining the flowchart, and check those items during the troubleshooting procedure.
3. See instructions in Chapter 3, "Disassembly and Assembly," to replace projector units.
4. Before making a functional check, check connections.
5. After replacing any unit listed below, make adjustments explained in Chapter 5.

Table 4-1.

No.	Name
1	Optical Unit
2	Driver board
3	Main board
4	ROM (IC304) on the main board

6. After troubleshooting, make functional checks using the image adjustment program explained in Chapter 5, and verify that the problem has been solved.

4.1.1 Tools and Accessories Required for Troubleshooting

Tools and accessories required for projector troubleshooting (including fault isolation) are listed below.

Table 4-2.

Name	Quantity	Use / Remarks
Projector screen	1	To project images
Ruler (10 feet, 3 m)	1	To measure the projection distance
Small-size mirror	1	To check the optical axis (digital mirror or round mirror with a diameter of approx. 2 cm)
Host computer	1	To supply test patterns (PC-compatible)
Color display	1	To manipulate and display on host computer
Video equipment	1	To test source 2 (video input) (video deck, video camera, etc.)
External speaker unit	1	To test voice output (with audio cable terminals)
Test program diskette	1	To adjust image quality
Multimeter	1	To measure resistances and voltages (AC/DC)
Tool set	1 set	Tools and accessories listed in Section 3.1
Illuminometer	1	To measure illuminance
Color meter (chronometer)	1	To measure R, G, and B components

4.1.2 Field Replacement Parts

For a list of parts that may need to be replaced during troubleshooting, such as boards, cases, plates, and screws, refer to the parts list in the appendix of this manual.

4.2 First Action

Follow the flowchart below before starting to troubleshoot projector problems, and proceed to the pertinent detailed flowchart (given on the next and subsequent pages).

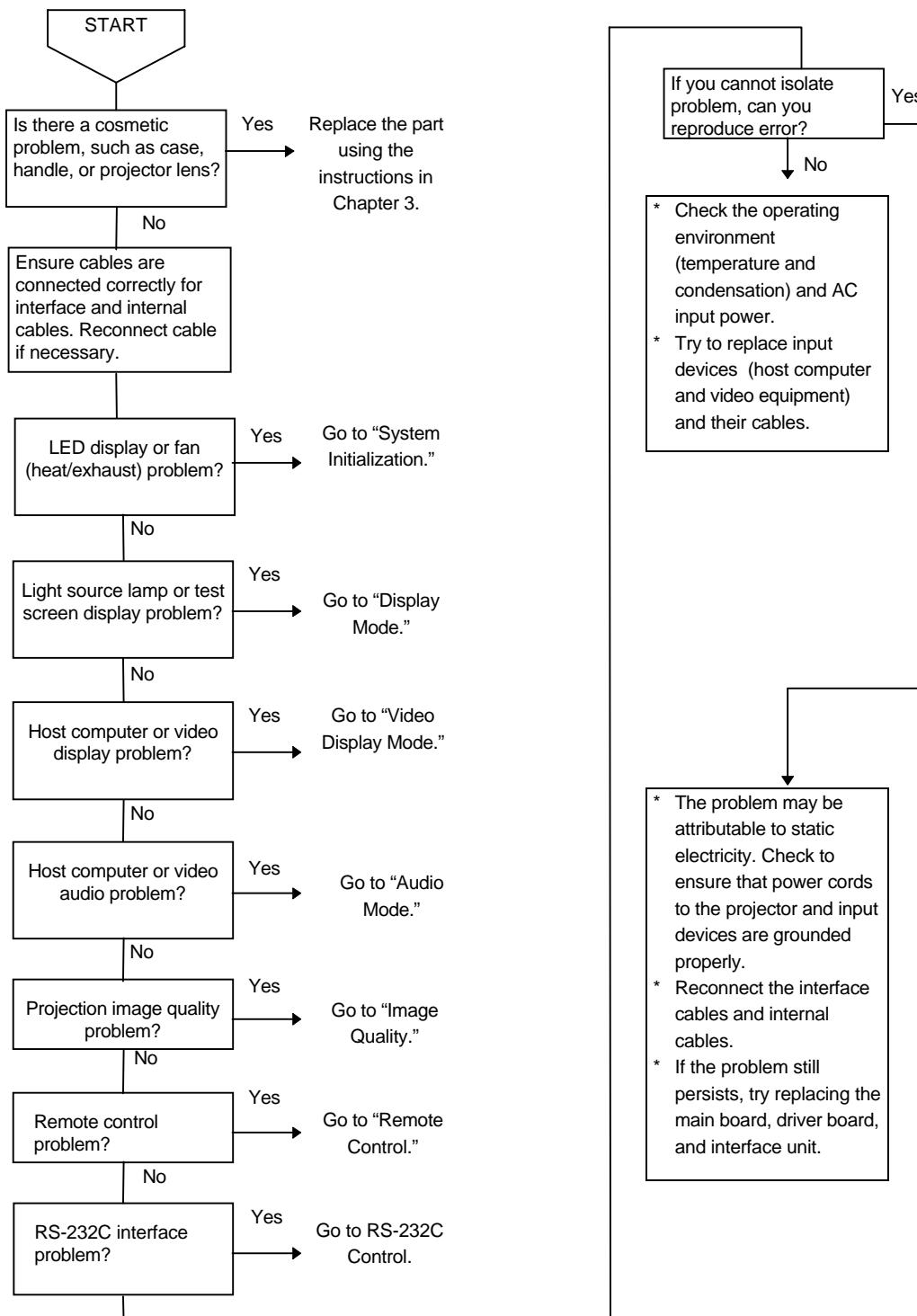


Figure 4-1.

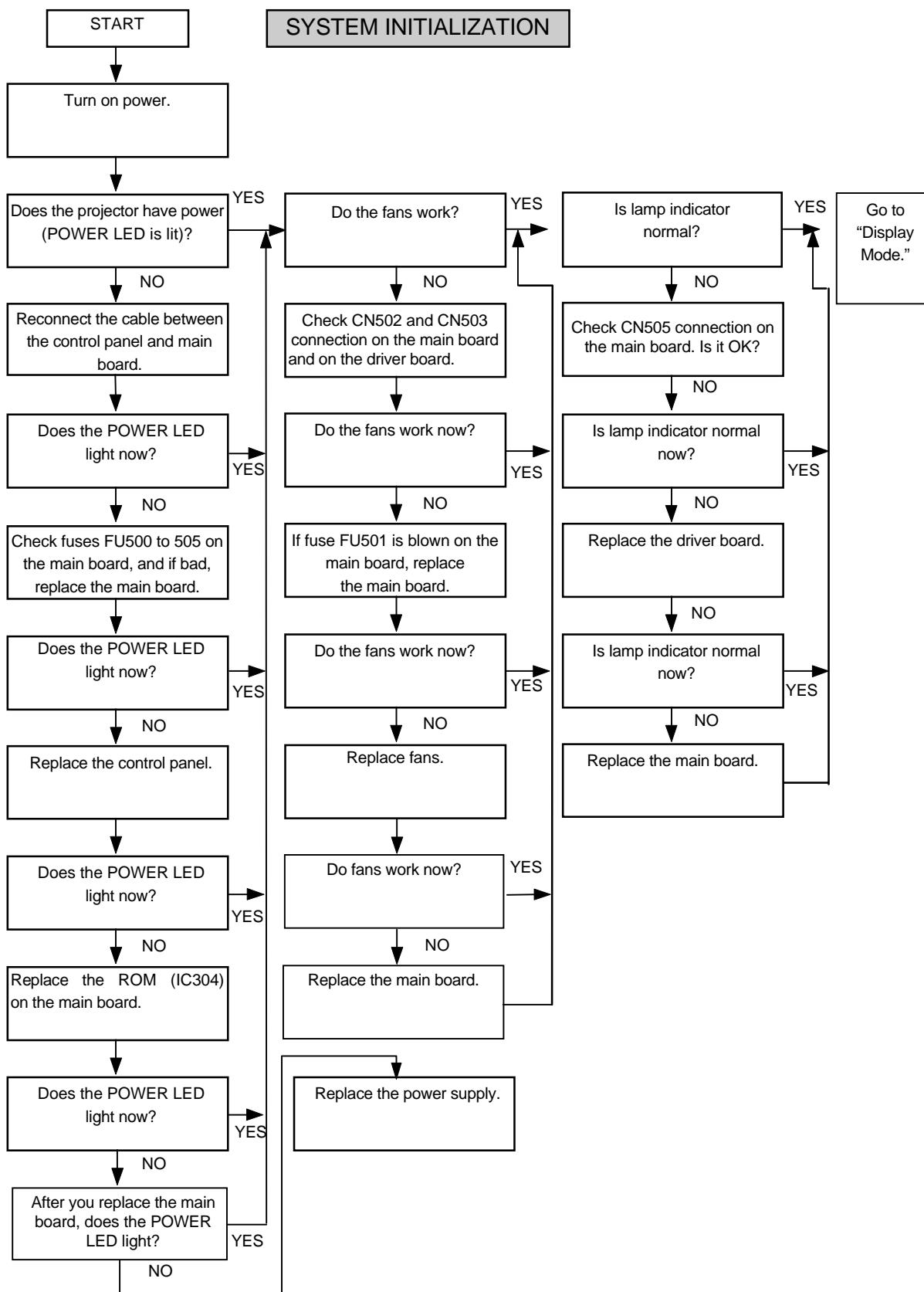


Figure 4-2.

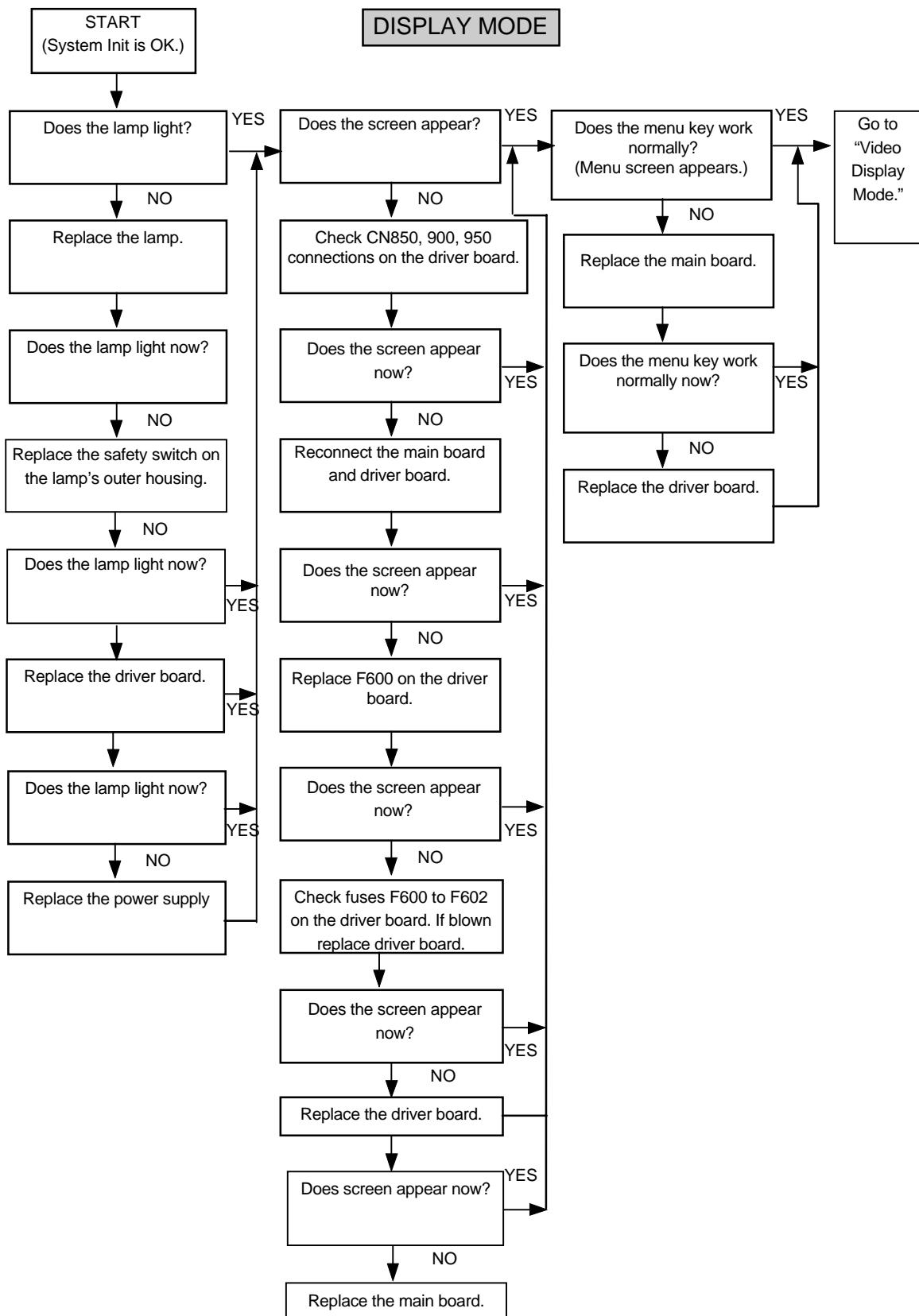
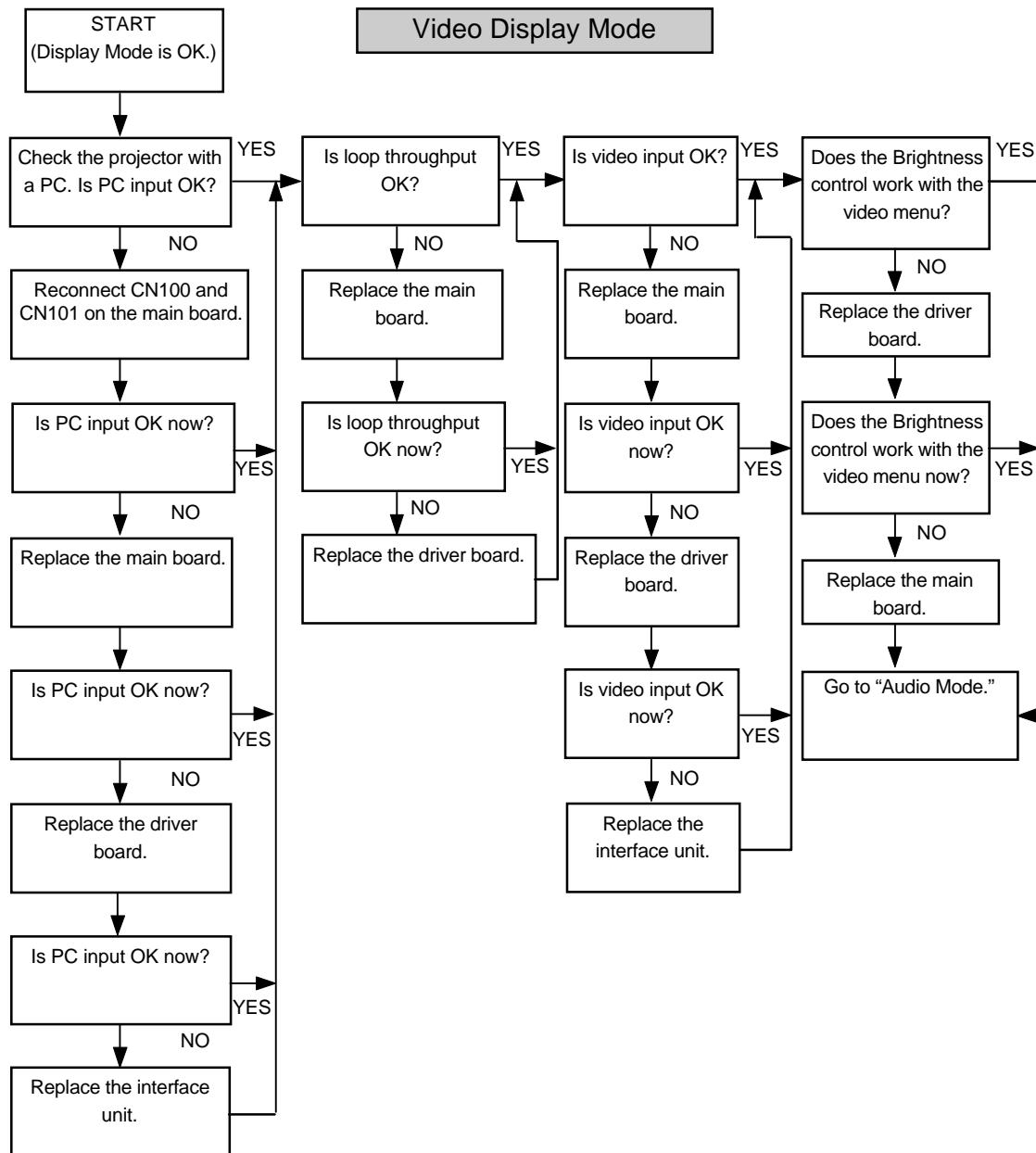


Figure 4-3.

**Figure 4-4.**

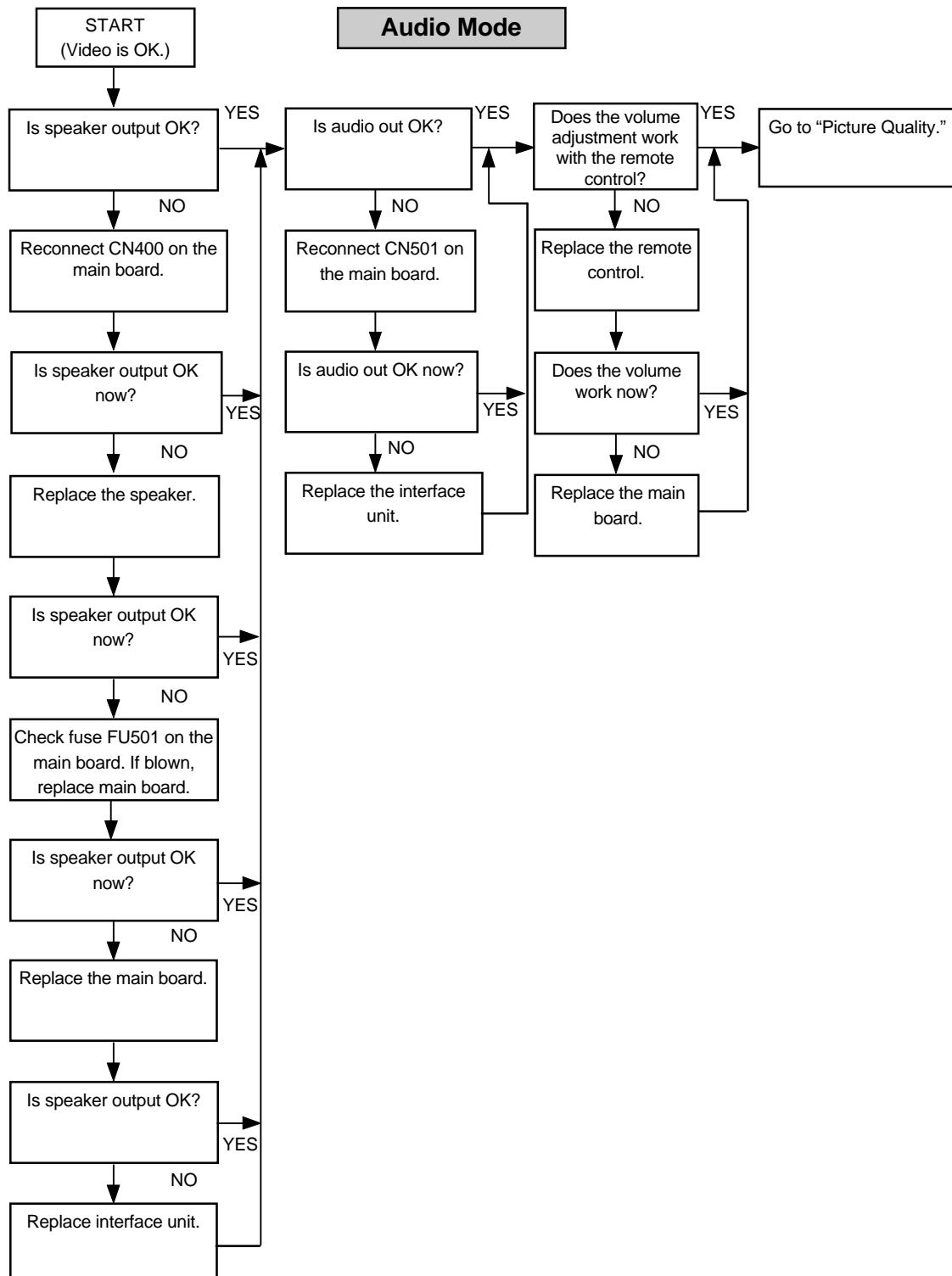


Figure 4-5.

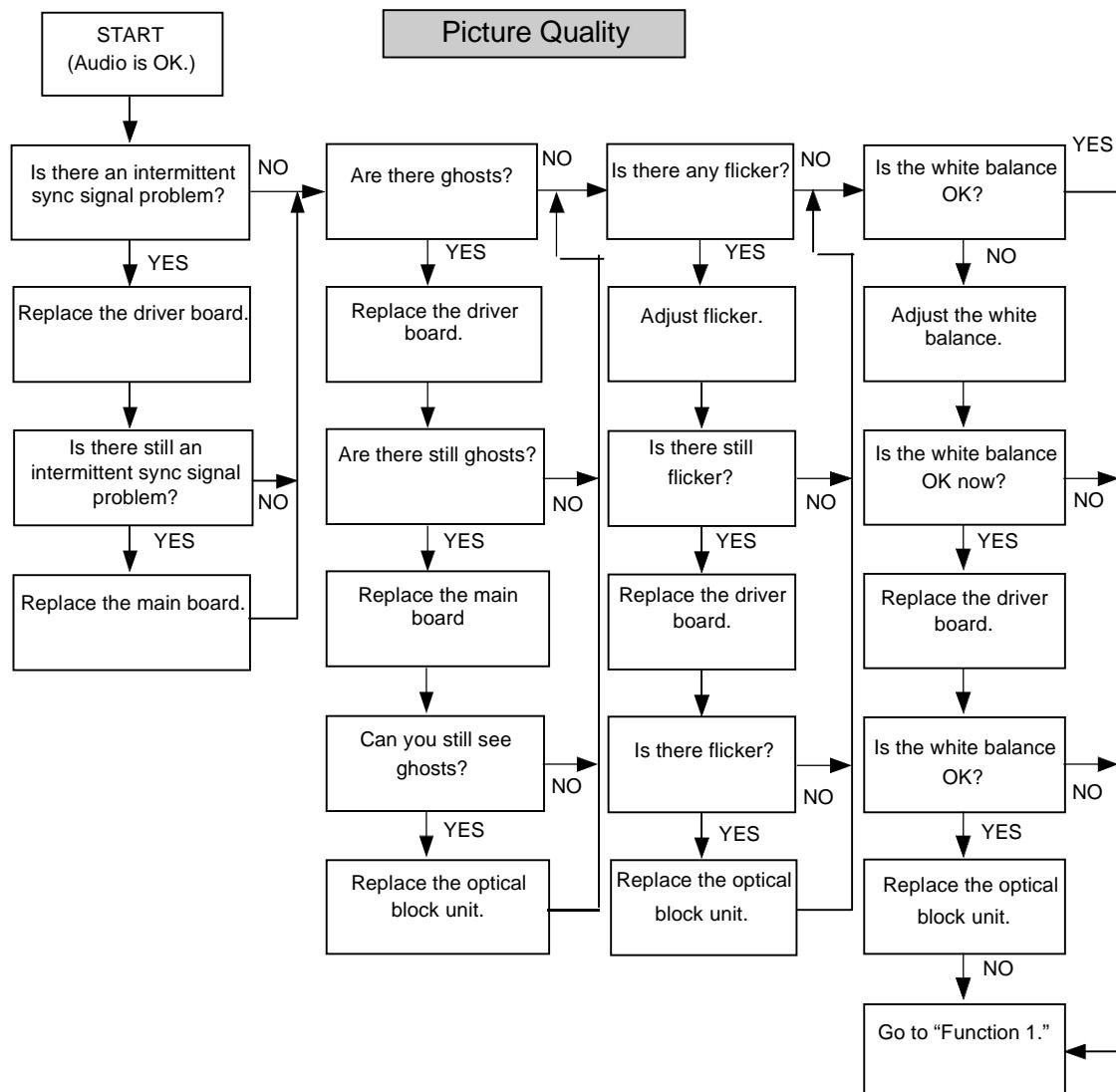
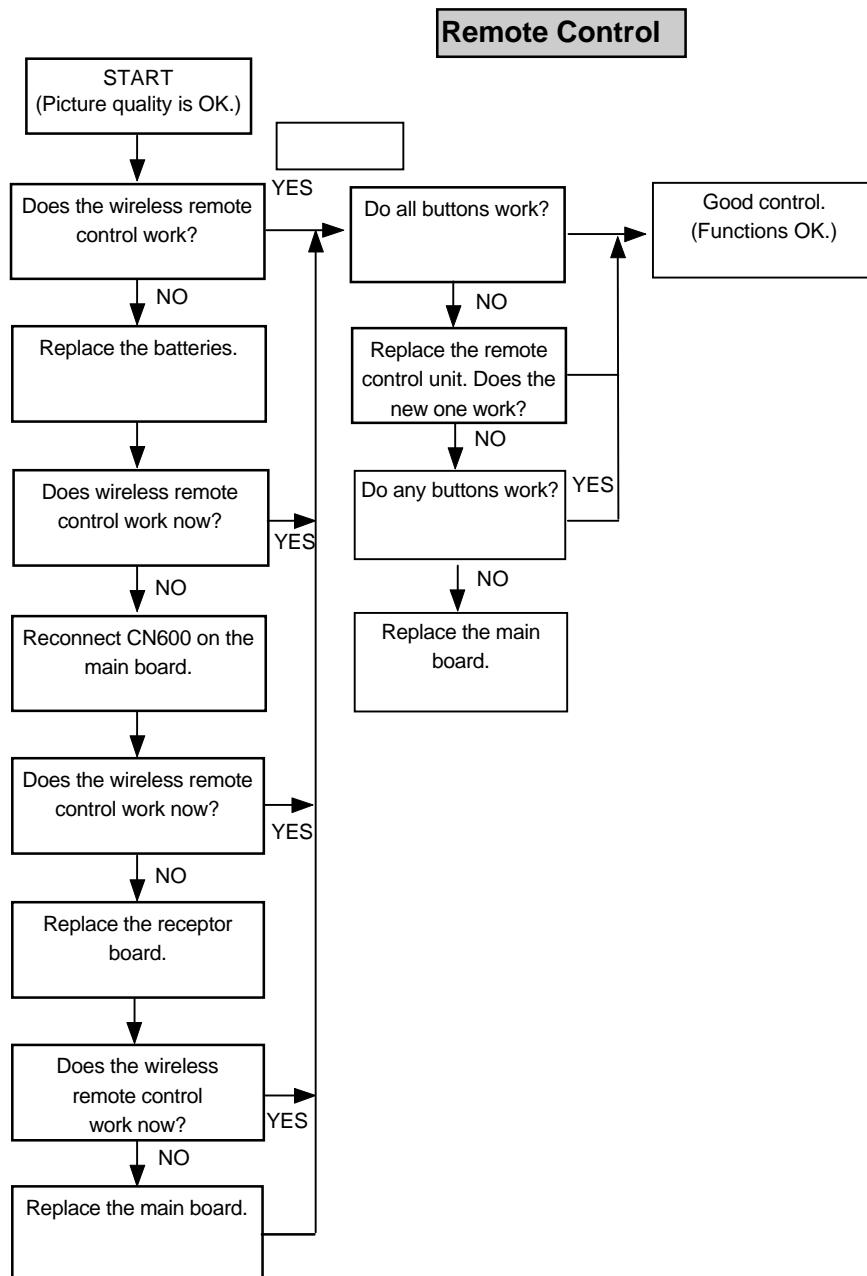


Figure 4-6.

**Figure 4-7.**

5.1 Image Adjustment Program

This program diskette contains the adjustment functions in the table below.

Table 5-1.

Number	Image adjustment program function
1	Flicker adjustment using a 16-level grayscale pattern
2	Ghost adjustment using a vertical stripe pattern
3	Sub contrast (tint) adjustment using a 16-level grayscale pattern

To run this program, set up a host computer and monitor, and connect them to the projector using a computer cable and an RS-232C cable. Insert the image adjustment program diskette in the diskette drive, and run the program. A menu appears. Select the menu options and program the settings into the flash ROM on the projector's main board.

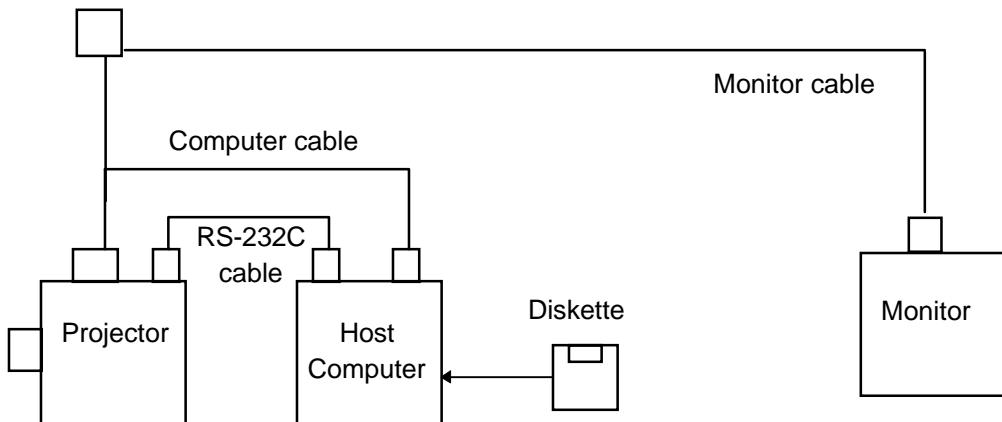


Figure 5-1.

5.1.1 When to Use the Image Adjustment Program

The table below lists conditions that require adjustments in the image adjustment program.

Table 5-2.

Condition	Adjustment
Optical block replacement	Flicker adjustment
	Ghost adjustment
	Sub contrast adjustment
Flash ROM replacement	
Main board replacement	

After completing the focus alignment, you should use the image adjustment program to obtain the best display quality. This program specifies the electrical parameters in order to obtain best display quality.

5.1.2 Running the Program

The image adjustment program is supplied on an MS-DOS diskette. Follow the messages in the image adjustment program as you select menu options.

When menu options 1 through 4 are executed, the image adjustment program transfers the adjusted settings to the projector's RAM via the RS-232C interface. Unless you save these settings, they are lost and invalid when the projector is restarted. Therefore, once you make adjustments in the image adjustment program, choose menu option 5, "Data Transfer," to program settings into the projector's flash ROM.

- * Do not use menu option 6 (standard data transfer) unless specifically told to do so.

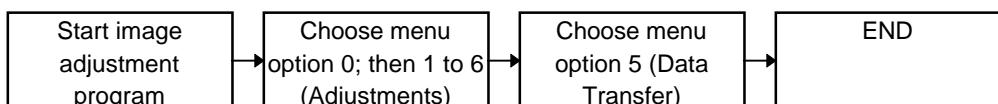


Figure 5-2

1. Place the screen about 8 feet (2.4 m) away from the projector.
2. Turn on the projector and host computer.
3. Adjust the focus ring on the projector so that the projected image on the screen is in focus. Use the zoom ring to set the screen projection size to 60 inches.

Start-up Procedure

Windows 95 system

1. Insert the image adjustment program diskette into the diskette drive.
2. Select the **My computer** from the initial computer display.
3. Be sure the screen displays **My computer**. Then select the **3.5 inch FD(A:)** icon.
4. Make sure the screen displays an **RS353AS** folder, then select it.
5. Make sure the screen displays a **AS6** folder, then select it.
6. Make sure the screen displays an **RS353ASE.EXE** file, then select it.

MS-DOS or Windows 3.1 system

1. Make sure the computer screen displays the **C:\>** prompt. If Windows 3.1 is running, select the MS-DOS prompt from the Program Manager or exit Windows and display the **C:\>** prompt. (If the **C:\WINDOWS>** prompt appears on the screen instead of **C:\>**, type **CD** then press **Enter**.)

2. Type **A:**, then press **Enter (C:\>A: Enter)**.
3. Make sure the **A:\>** prompt appears on the computer screen.
4. Type **CD RS353AS**; then press **Enter (A:\> CD RS353AS Enter)**.
5. Make sure the **A:\RS353AS>** prompt appears on the computer screen.
6. Type **CD AS6**; then press **Enter (A:\RS353AS>CD AS6 Enter)**
7. Make sure **A:\RS353AS\AS6>** appears on the screen.
8. Type **RS353ASE** then press **Enter (A:\RS353AS\AS6>RS353ASE Enter)**

Image Adjustment Program Menu

After the program starts, the following display appears on the computer screen.

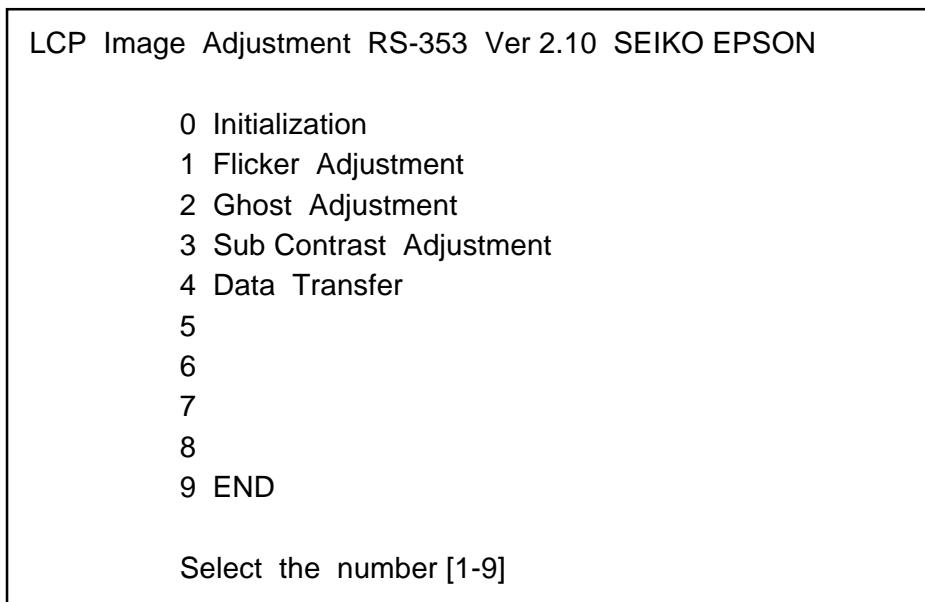


Figure 5-3.

0. Initialization

Type **0**. The message “SET LCP COMMUNICATION MODE” appears on the computer screen after you select this menu. Then, the program feeds data automatically into the registers for gamma registration. The projector displays the red, green, and blue grayscale patterns to allow you to adjust flicker, ghosts, and contrast.

1. Flicker Adjustment

1. Type **1** from the main menu to adjust the flicker.
2. Make sure the projector displays the 16-level red-scale pattern at the top of the screen. (Dark patterns appear on the left side; brighter patterns on the right side.)

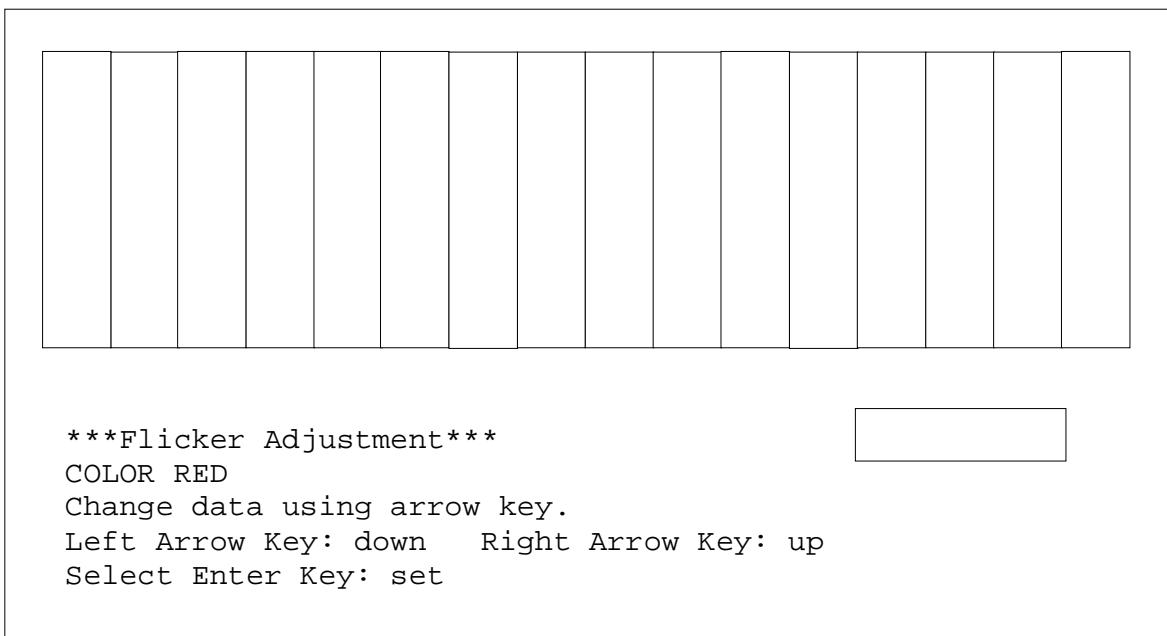


Figure 5-4.

3. Use the arrow keys to increase or decrease the value by one. Find the display with the minimum flicker.
 - * When you press the left arrow key, an adjustment value from "0(00) to 64(40)" appears in the lower left corner of the screen.
4. Press **Enter**, and a 16-level green-scale pattern should appear on the projector screen.
5. Just as in step 3, find the display with the minimum flicker.
6. Press **Enter**, and a 16-level blue-scale pattern should appear on the projector screen.
7. Just as in step 3, find the display state with the minimum flicker.

2. Ghost Adjustment

1. Type **2** from the main menu to eliminate ghosts.
2. Make sure the projector displays the 16-level red-scale pattern section at the top of the screen. (Dark patterns appear on the left side; brighter patterns on the right side.)

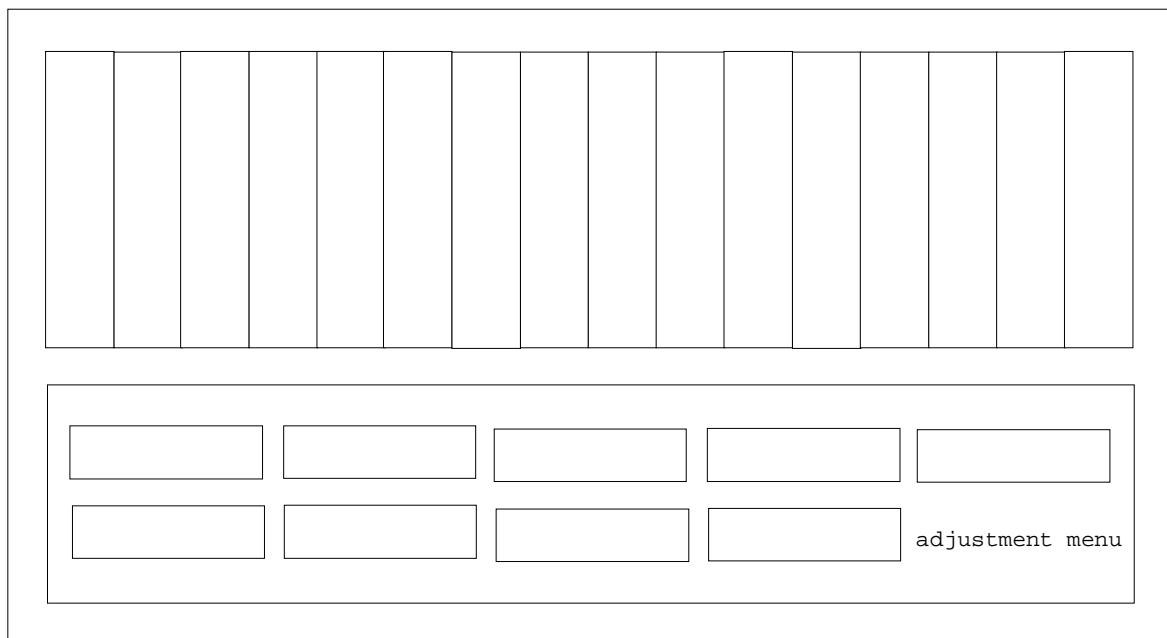
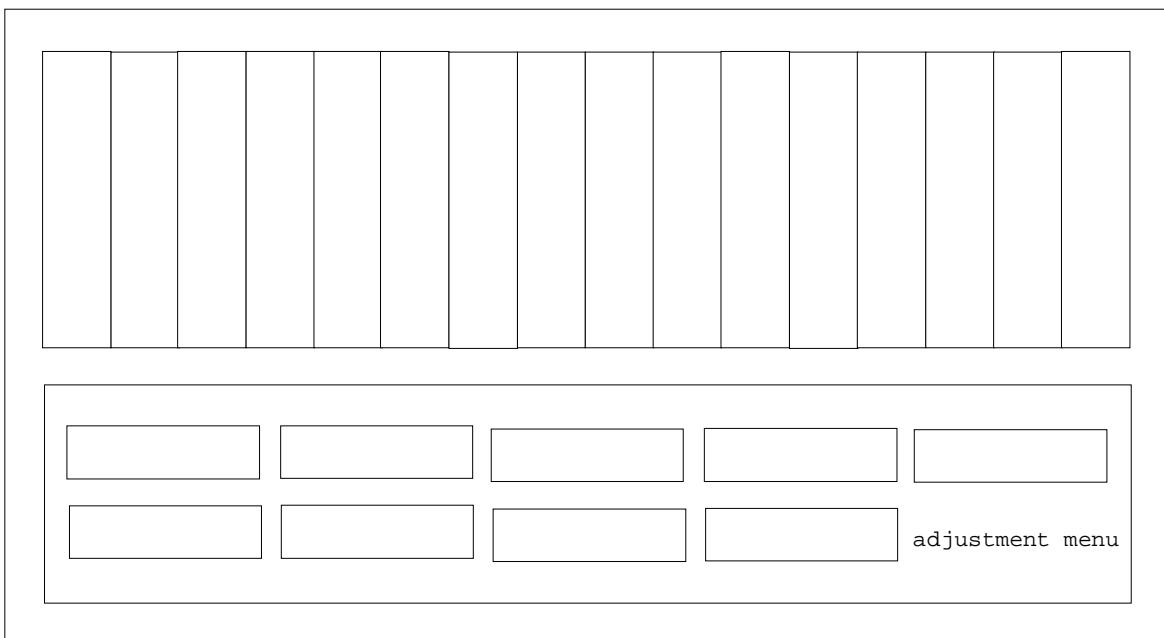


Figure 5-5.

3. Use the right and left arrow keys to make the border line between each block in the pattern thinnest (least overlap in border lines, or no ghost image to the left or right of the border lines).
 - * When you press the left arrow key, an adjustment value from 0 to 3 appears in the lower left corner of the screen.
4. Press **Enter**, and a 16-level green-scale pattern should appear on the screen.
5. Just as in step 3, adjust the image so the border line of each pattern appears thinnest.
6. Press **Enter**, and a 16-level blue-scale pattern should appear on the screen.
7. Just as in step 3, adjust the image so the border line of each pattern appears thinnest.

3. Sub Contrast Adjustment

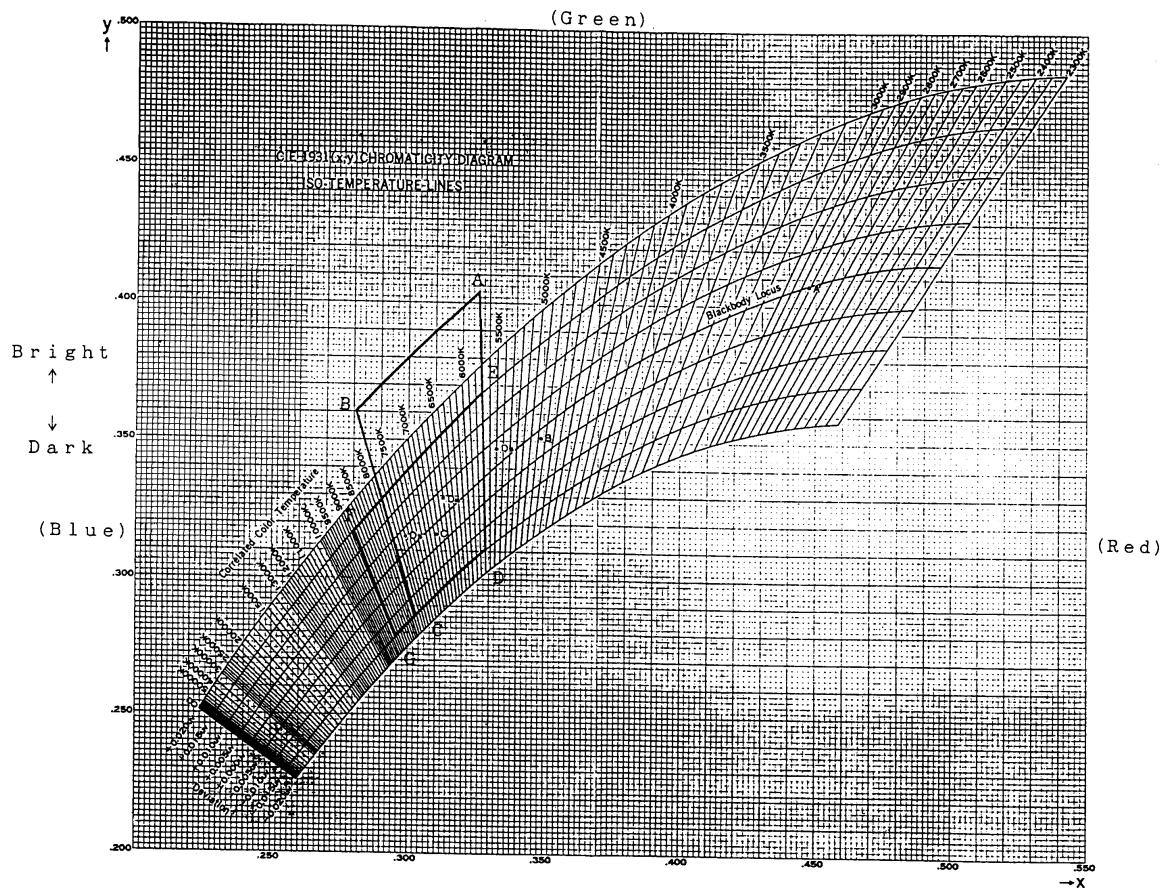
1. Type **3** from the main menu to adjust the contrast.
2. Make sure the projector displays the 16-level red-scale pattern section at the top of the screen. (Dark patterns appear on the left side; brighter patterns on the right side.)

**Figure 5-6.**

3. Use the right and left arrow keys to adjust the image so that the two patterns on the right side are brightest and are of equal intensity.
* When you press the left arrow key, an adjustment value from "0(00) to 64(40)" appears in the lower left corner of the screen.
4. Press **Enter**, and a 16-level green-scale pattern should appear on the screen.
5. Just as in step 3, adjust so that the two blocks on the right are brightest.
6. Press **Enter**, and a 16-level blue-scale pattern should appear on the screen.
7. Just as in step 3, adjust so that the two right blocks are brightest.
8. Press **Enter**, and the following message appears on the screen:

Are you sure? [Y/N]

9. Look at the white balance on the screen. If the hue of 16-level grayscale pattern seems reddish, greenish, or bluish, you must type **N** and run the sub-contrast adjustment again. If the white balance is satisfactory, type **Y**.
10. Use the eighth raster in the 16-grayscale pattern on the projection screen to check the white balance. Type **Y** if the sub contrast adjustment is satisfactory. Type **N** to rerun the sub contrast adjustment.
11. Check for the brightest raster in 16-level grayscale pattern. Put a color meter on the projector screen, and measure the chromatophore X and Y. Then plot a measurement value on the diagram below. The plot point should be in the range A-B-C-D of the diagram. If the point is out of range, you should type **N**, and redo steps 3 to 11. Type **Y** if the sub contrast adjustment is satisfactory. Type **N** to rerun the sub contrast adjustment.

**Figure 5-7.**

4. Data Transfer

This menu option writes the settings into the projector's flash ROM. The values you have set will not be saved in the projector unless you execute this menu step. Be sure to run this menu option after making any adjustment with the image adjustment program.

1. Type **4**, from the main menu for Data transfer.
2. Make sure the top line of following messages appear on the monitor screen.

```
Create New HEX file? [Y/N]
File Name: 004
File Name: 00400000.gam

00400000.gam Data Transfer
<<Flash ROM download program>>
Port: COM1
Baud Rate: 9600bps
Parity: None
Stop Bit: 1
Data Length: 8
Download Area: GAMMA
GAMMA File: 00400000.GAM
Are you sure? [Y/N] Y
Flash download was successful.
```

Figure 5-8.

3. Type **Y** if all settings are OK. The image adjustment program starts writing values into the projector's flash ROM. Type **N** to bring back the main menu and rerun adjustments.

9. End

Type **9** to terminate the image adjustment program. The **A:>** prompt will appear on the computer screen.

A.1 Reference Materials

Table A-1. ELP-3500 Parts List

Figure Ref. No.	Description	Mfr. Part No.	Min. Qty PO	Specification
1	Lower Case Unit	1031084	8	
1-1	Lower Case	1031085	10	
1-1-1	Foot Rubber	1031057	10	
1-1-2	Lamp Cover Unit	1031113	10	
1-2	Mini Clamp	1033021	10	
1-3	Shield Sheet	1033649	10	
1-4	Shield Gasket	1033650	10	
1-5	Foot Lever R	1031088	10	
1-6	Foot Lever L	1031089	10	
1-7	Foot Lever Pin	1031090	10	
1-8	Foot Spring	1031091	10	
1-9	Foot Axis	1031092	10	
1-10	Foot Adjuster	1031093	10	
1-11	Foot Sheet	1033226	10	
1-12	Inlet Unit	1031094	1	
1-13	Air Filter Frame Unit	1031275	10	
1-14	Shield Cushion A	1033619	100	
1-15	Shield Cushion B	1033620	100	
2	Power Supply Block	2022610	1	
2-1	Power Supply Unit	2022611	1	
2-2	Ballast Circuit Assembly	2022612		
2-3	SCI Cable	2023104	10	
2-4	Receptor Board Block	2022614	1	
2-5	Receptor Board Block Fixing Screw	1033122	100	3xs F/Ni
3	Lamp Connect B Fixing Screw	1021824	100	3x8 F/Zn
4	Inlet Board Fixing Screw	1021824	100	3x8 F/Zn
5	Power Supply Unit Fixing Screw	1021824	100	3x8 F/Zn
6	Interface Unit	1031100	1	
6-1	Interface Unit Fixing Screw	1021824	100	3x8 F/Zn
7	Optical Head Block	1033014	1	
7-1-10-4	Thermo Sensor Assembly	1033918	10	
7-1-10-5	Sensor Frame Fixing Screw	1033919	10	
7-1-11	Light Valve Block Fixing Screw	1021821	100	S2W2 2.5x6 F/Zn
7-1-12	Cooling Fan	2022984	1	
7-1-13	Cooling Fan Fixing Screw	1032848	100	S2W1 4x20 F/Zn
7-1-14	Projector Lens Unit	1033235	1	
7-1-14-1	Lens Cap	1031519	10	
7-1-15	Projector Lens Unit Fixing Screw	1004532	100	4x6 F/Zn

Table A-1. ELP-3500 Parts List (Continued)

Figure Ref. No.	Description	Mfr. Part No.	Min. Qty PO	Specification
7-5	Lamp Outer Housing	1031104	10	
7-6	Lamp Outer Housing Fixing Screw	1021824	100	3x8 F/Zn
7-7	Lamp Inner Housing	1031106	1	
7-8	Driver Board Assembly	3001950	1	
7-9	Board Fixing Nat	1031552	10	SQ-12
8	Light Guide Block Fixing Screw	1021825	100	4x14 F/Zn
9	Lamp Air Guide	1032847	10	3x8 F/Zn
10	Lamp Air Guide Fixing Screw	1021824	100	
11	Safety Switch	2024036	10	
12	Safety Switch Fixing Screw	1021824	100	3x8 F/Zn
13	Exhaust Fan	2022985	1	
14	Fan Hold Plate	1031280	10	
15	Exhaust Fan Fixing Screw	1022793	100	4x10 F/Zn
16	Fan Hold Plate Fixing Screw	1021824	100	3x8 F/Zn
17	Fan Hold Plate Fixing Screw	1033122	100	3x6 F/Ni
18	Main Board Assembly	3001944	1	
19	Main Board Fixing Screw	1033122	100	3x6 F/Ni
20	Main Board Fixing Screw	1021823	100	3x12 F/Zn
21	GND Cable Fixing Screw	1033025	100	4x6 F/Ni
22	B. To B. Connector A	2023248	10	
23	B. To B. Connector B	2023249	10	
24	ROM	3002000	10	
25	GND Plate	1033225	10	
26	GND Plate Fixing Screw	1033122	100	3x6 F/Ni
27	FG Mesh	2023824	10	
28	Upper Case Unit	1031108	1	
28-1	Upper Case	1033022	10	
28-2	Remote Control Receptor Filter	1031111	10	
28-3	Clip Nat	1031547	100	
28-4	Speaker	2022618	10	
28-5	Speaker Sheet	1033023	10	
28-6	Speaker Fixing Screw	1021824	100	3x8 F/Zn
28-7	Speaker Cable	2022619	10	
28-8	Control Panel	1031110	1	
28-10	Shield Cushion C	1033621	100	
28-11	Shield Cushion D	1033622	100	
29	Handle	1031112	10	
30	Case Fixing Screw A	1033026	100	4x8 F/ZB
31	Case Fixing Screw B	1021823	100	3x12 F/Zn
32	Handle Holder	1021809	10	J003
33	Logotype Plate	1033024	10	
34	Carton Box Set	5005328	10	
35	Lower Pad	5005330	10	
36	Upper Pad	5005331	10	

Table A-1. ELP-3500 Parts List (Continued)

Figure Ref. No.	Description	Mfr. Part No.	Min. Qty PO	Specification
37	Accessory Box	5005332	10	
38	Accessory Holder	5005333	10	
39	Polyvinyl Bag	5004108	100	
40	Soft Bag	5003353	100	
41	Slip Sheet	4006219	100	
42	UPC Code Label	1031070	10	
43	Caution Label A (Lamp Exchange)	1031922	10	
44	Caution Label B (Never Look)	1026335	10	
45	Caution Label C (Don't Open)	1026265	10	
46	Caution Label D	1031432	10	
47	Road Service Sticker	1026940	10	
48	Energy Star Label	1028991	10	
49	Patent No. Seal	7540540	10	
50	User's Manual Set	4006222	10	
51	Seal Set	1031075	10	
52	AC Power Cable	2017328	10	
53	AV Cable	2016048	10	
54	Remote Control	1031082	10	
55	Mac Adapter	2023095	10	
56	Computer Cable	2022604	10	
57	Mouse Cable Set	2023724	10	

A.2 Exploded Diagrams

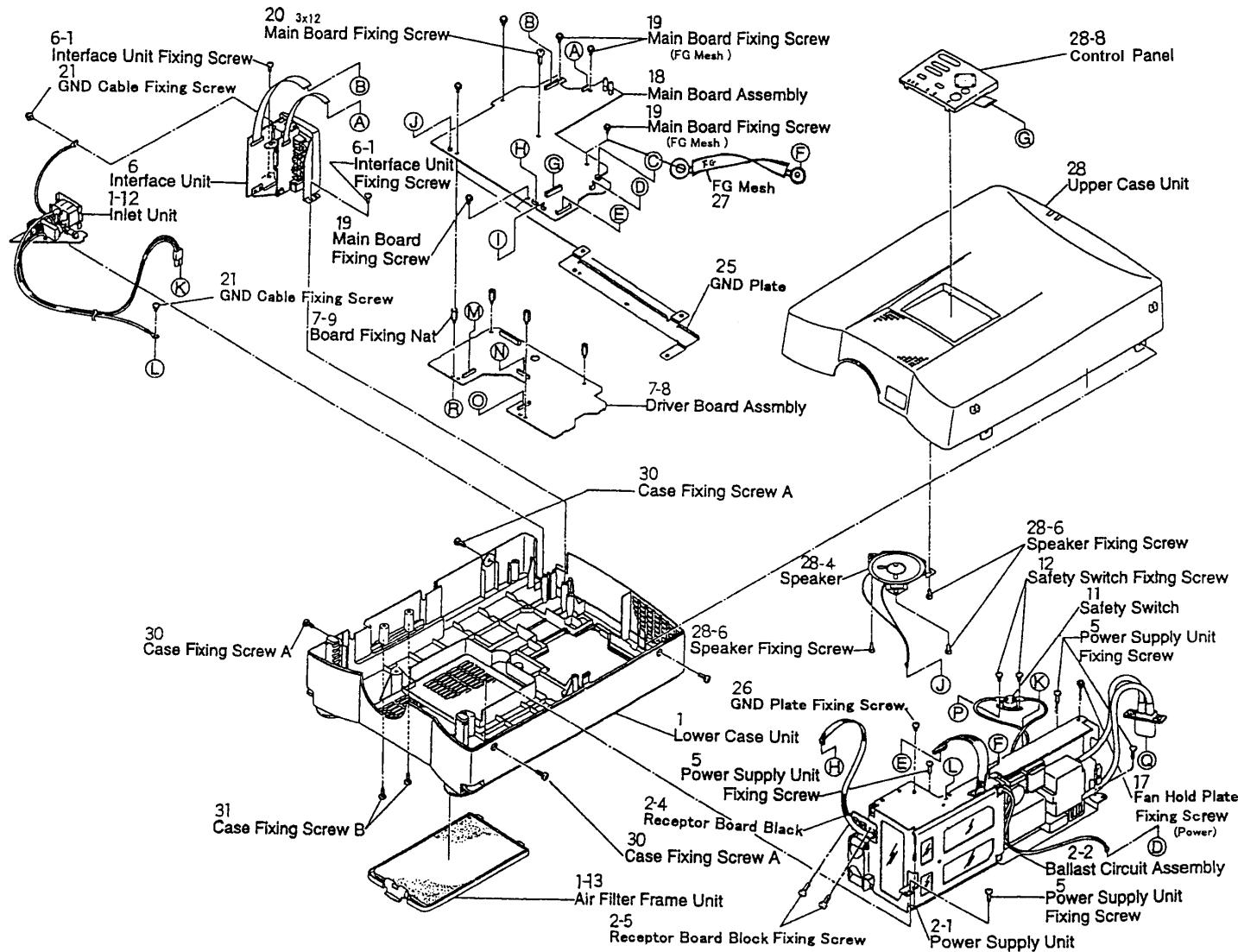


Figure A-1. Exploded Diagram 1

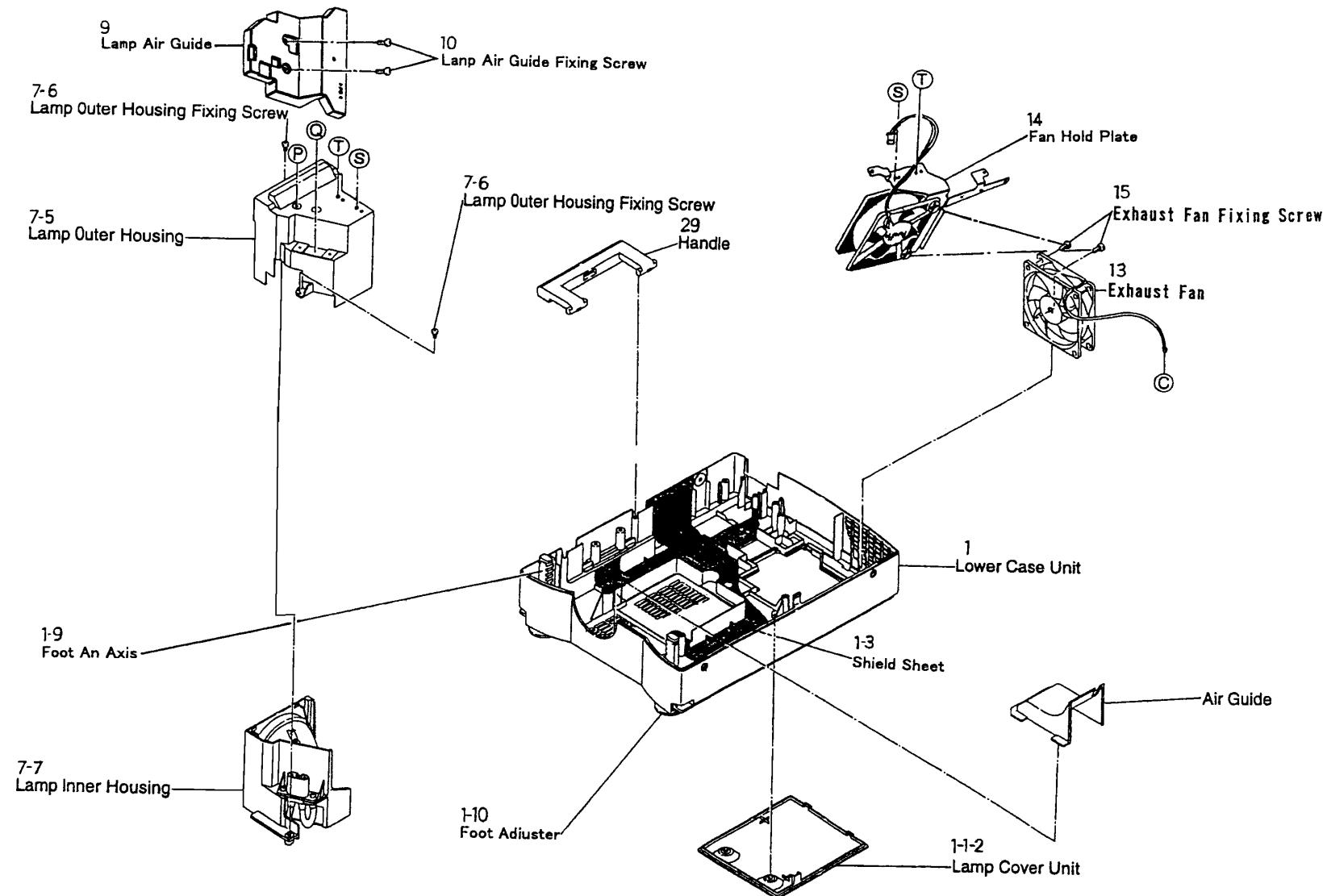


Figure A-2. Exploded Diagram 2

A.3 Schematic Diagrams

Figure A-3. Schematic Diagram 1

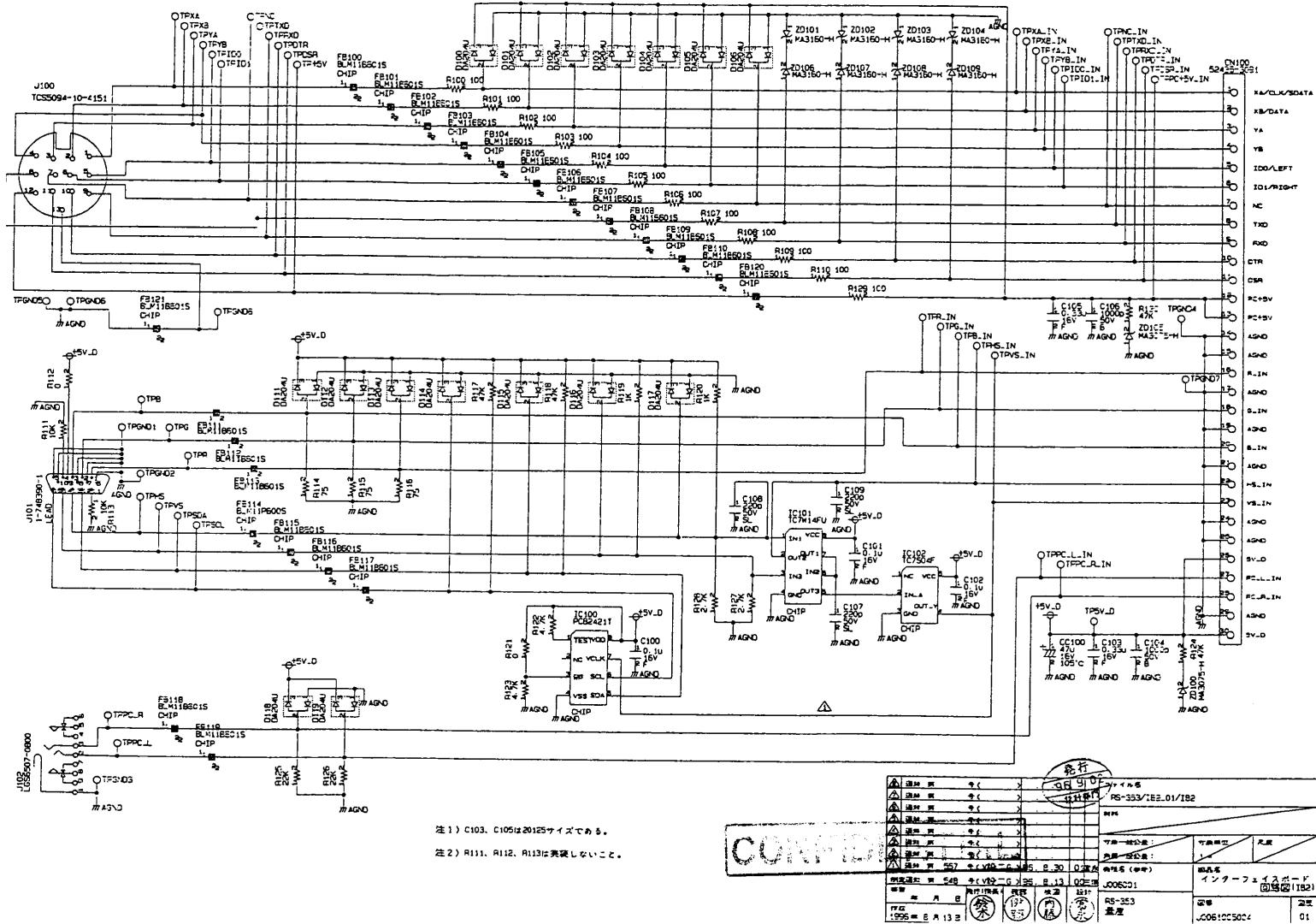


Figure A-4. Schematic Diagram 2

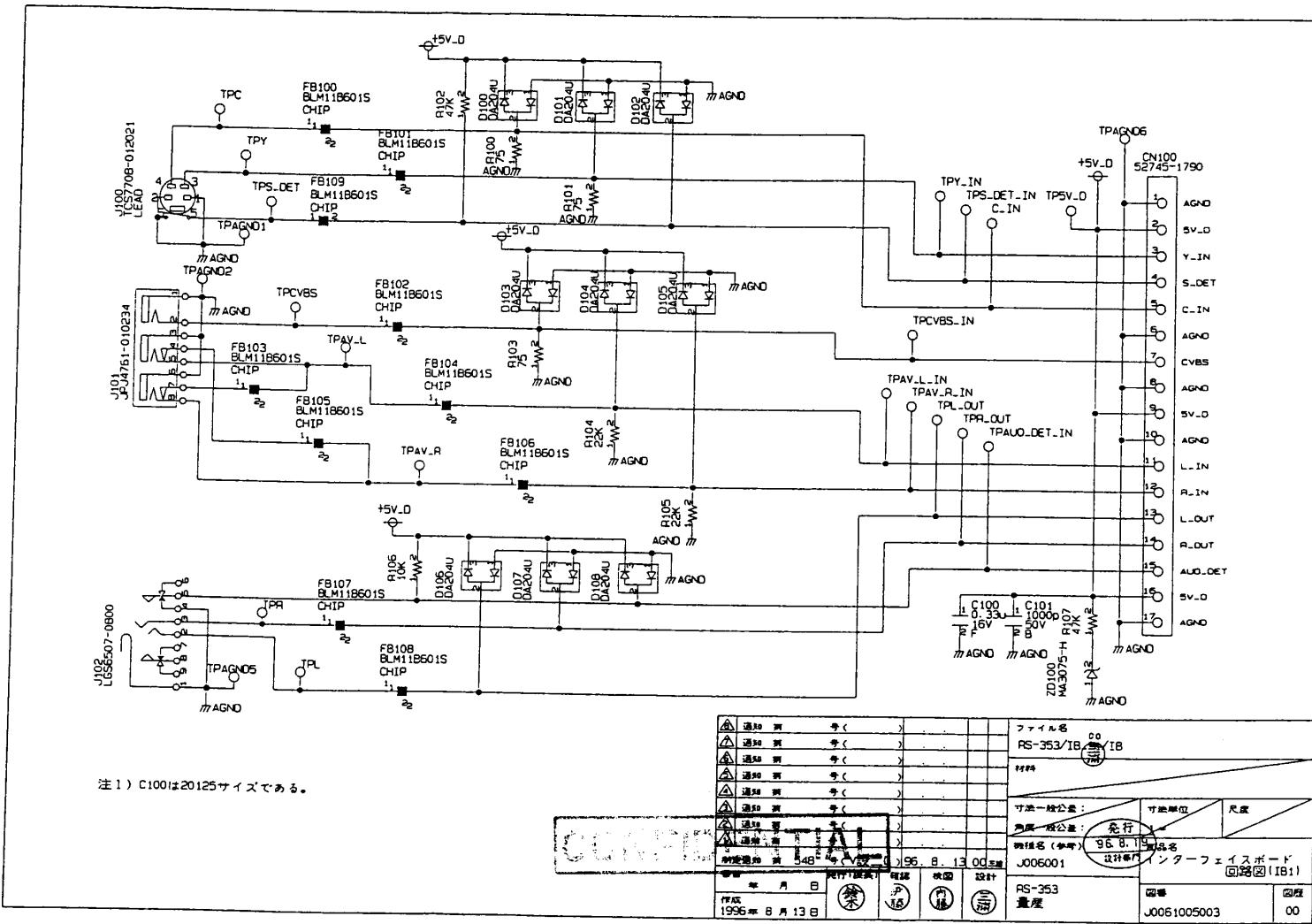
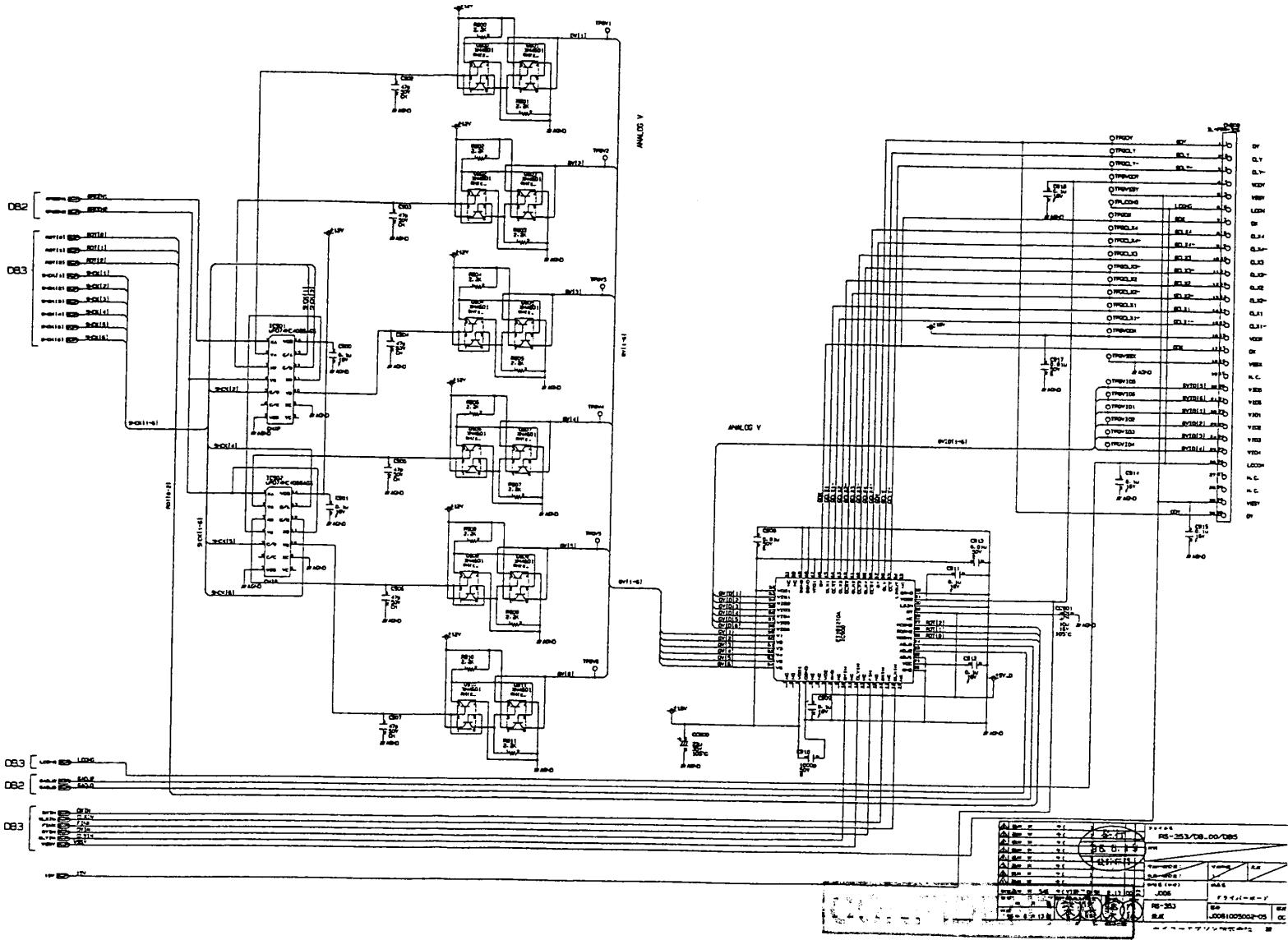


Figure A-5. Schematic Diagram 3



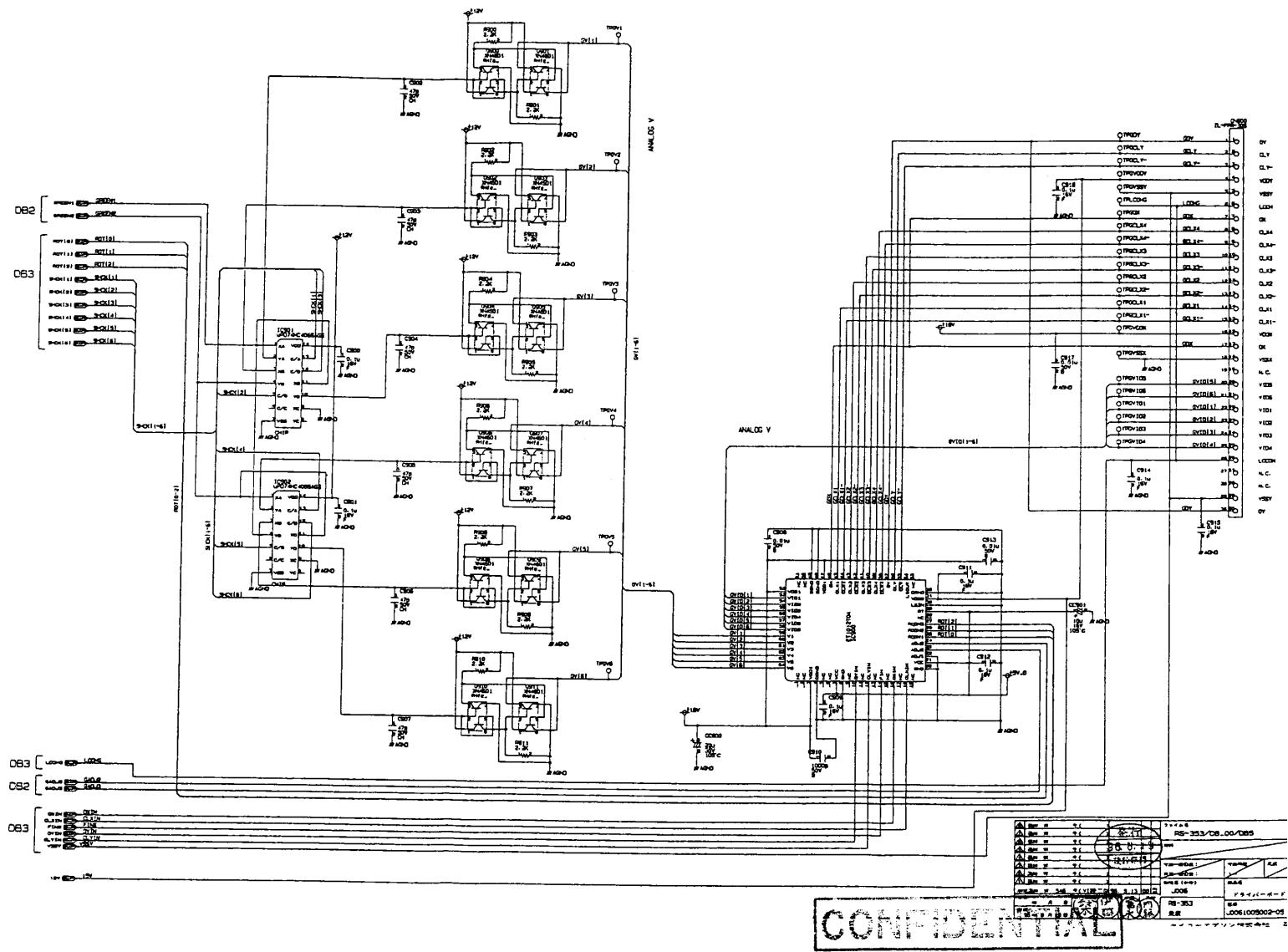


Figure A-6. Schematic Diagram 4

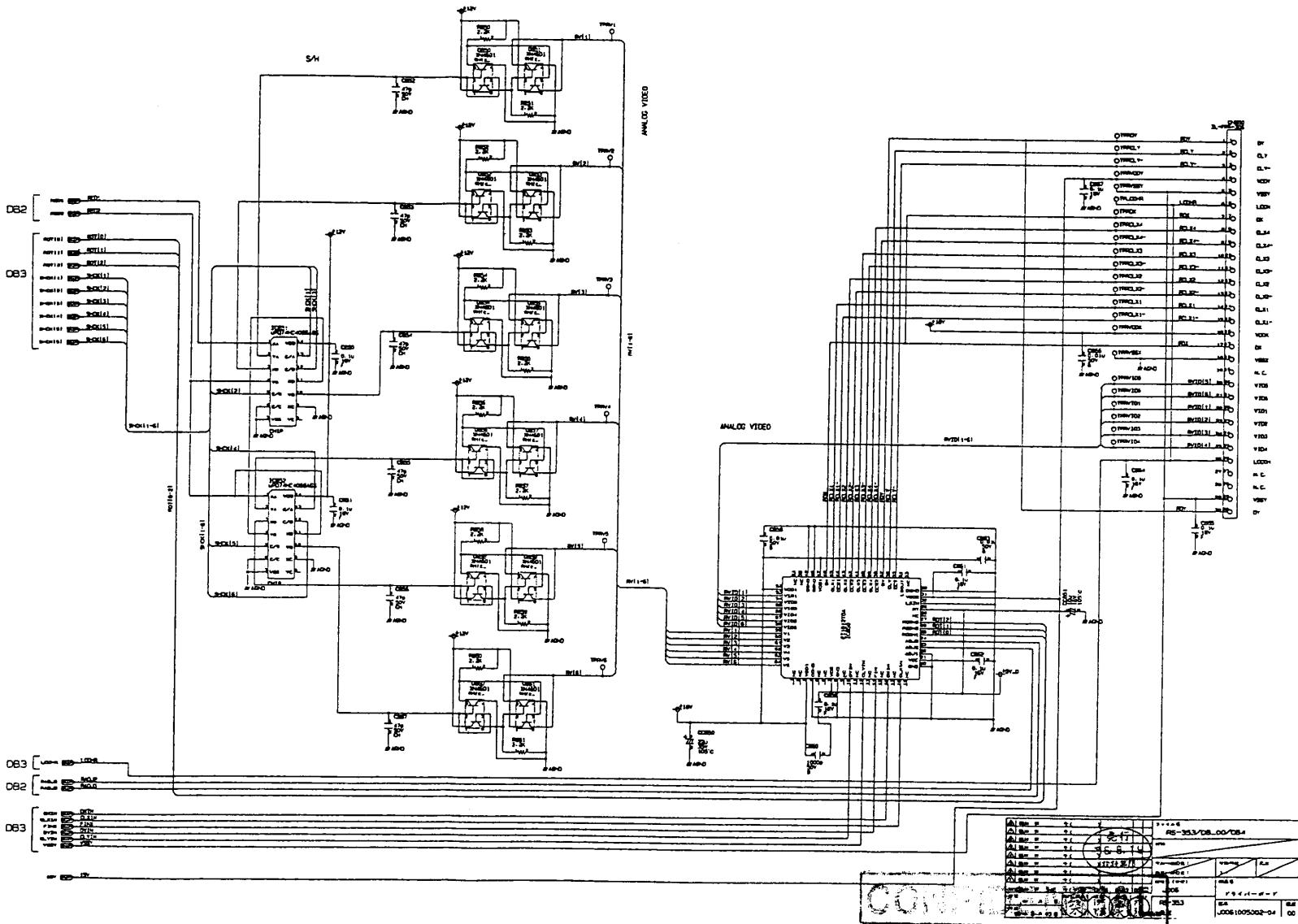


Figure A-7. Schematic Diagram 5

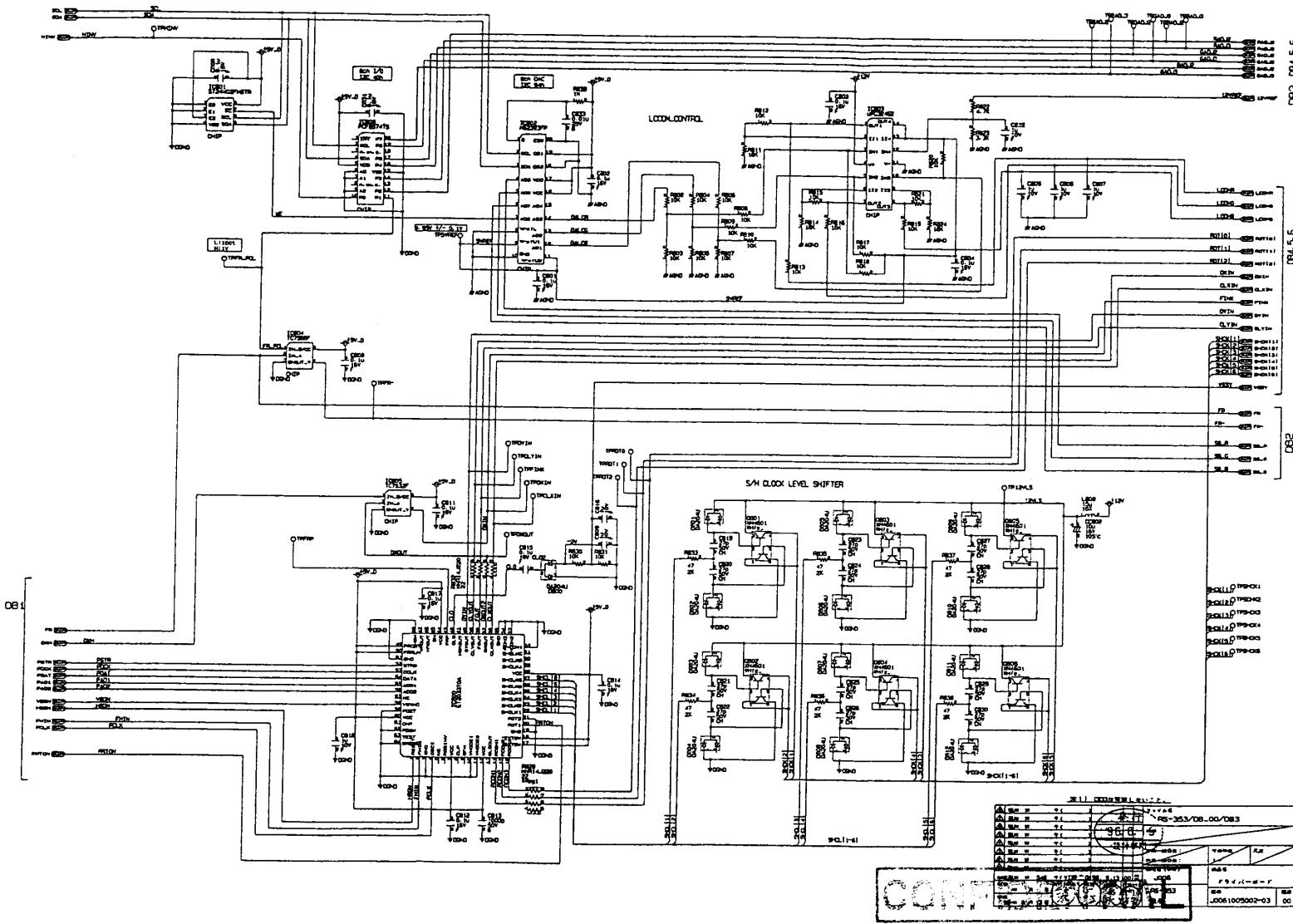


Figure A-8. Schematic Diagram 6

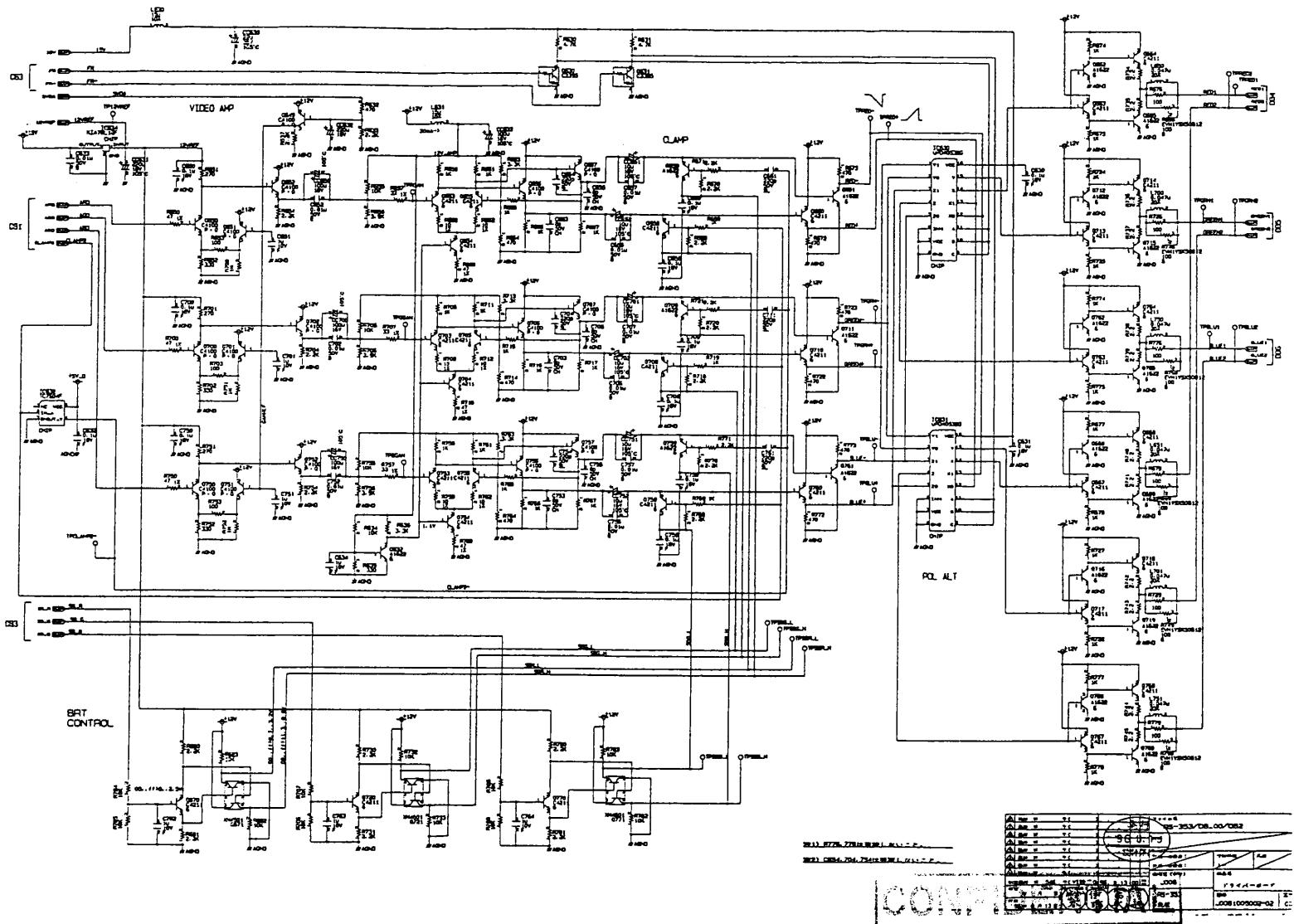


Figure A-9. Schematic Diagram 7

Figure A-10. Schematic Diagram 8

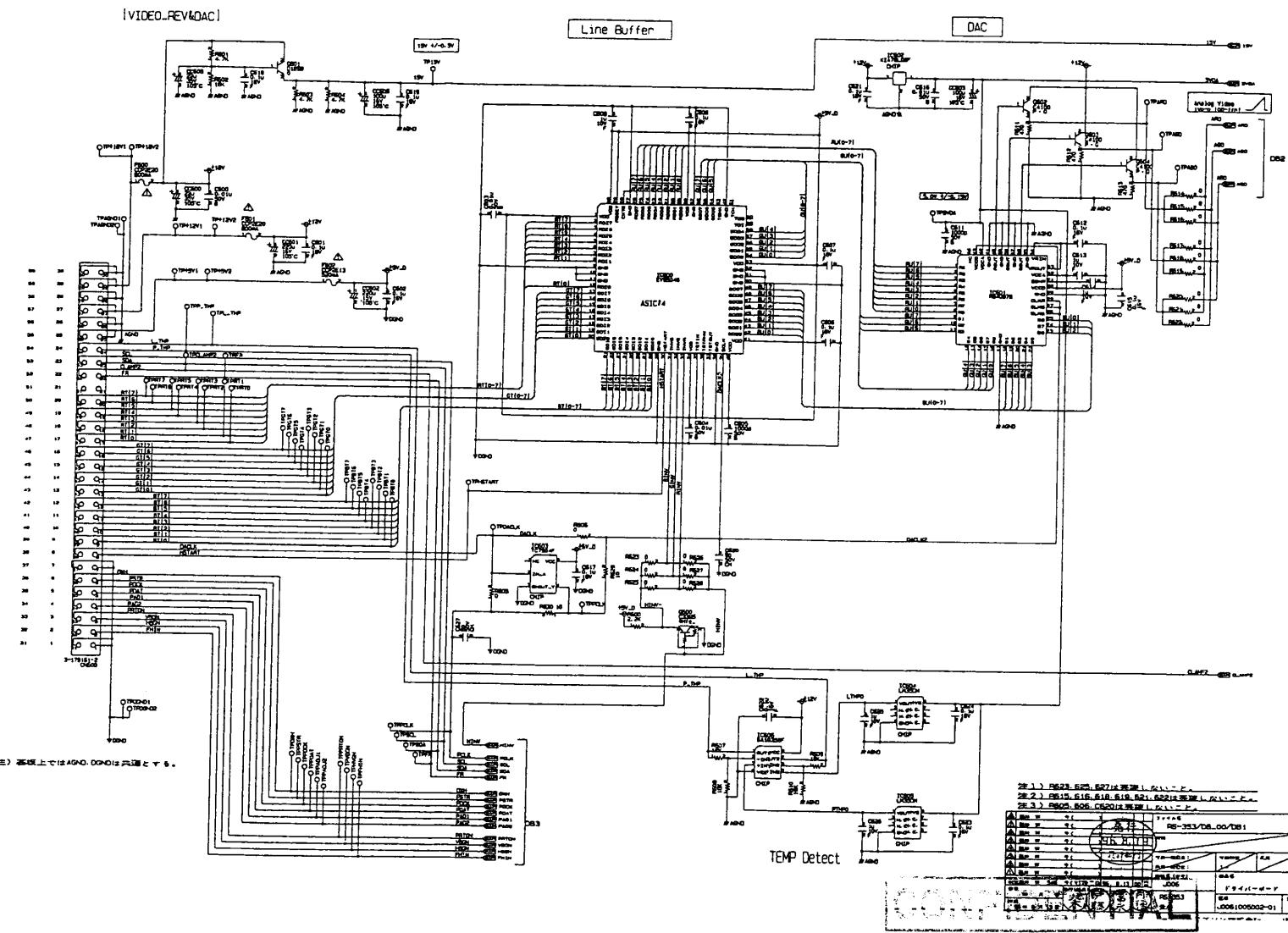


Figure A-11. Schematic Diagram 9

A-15

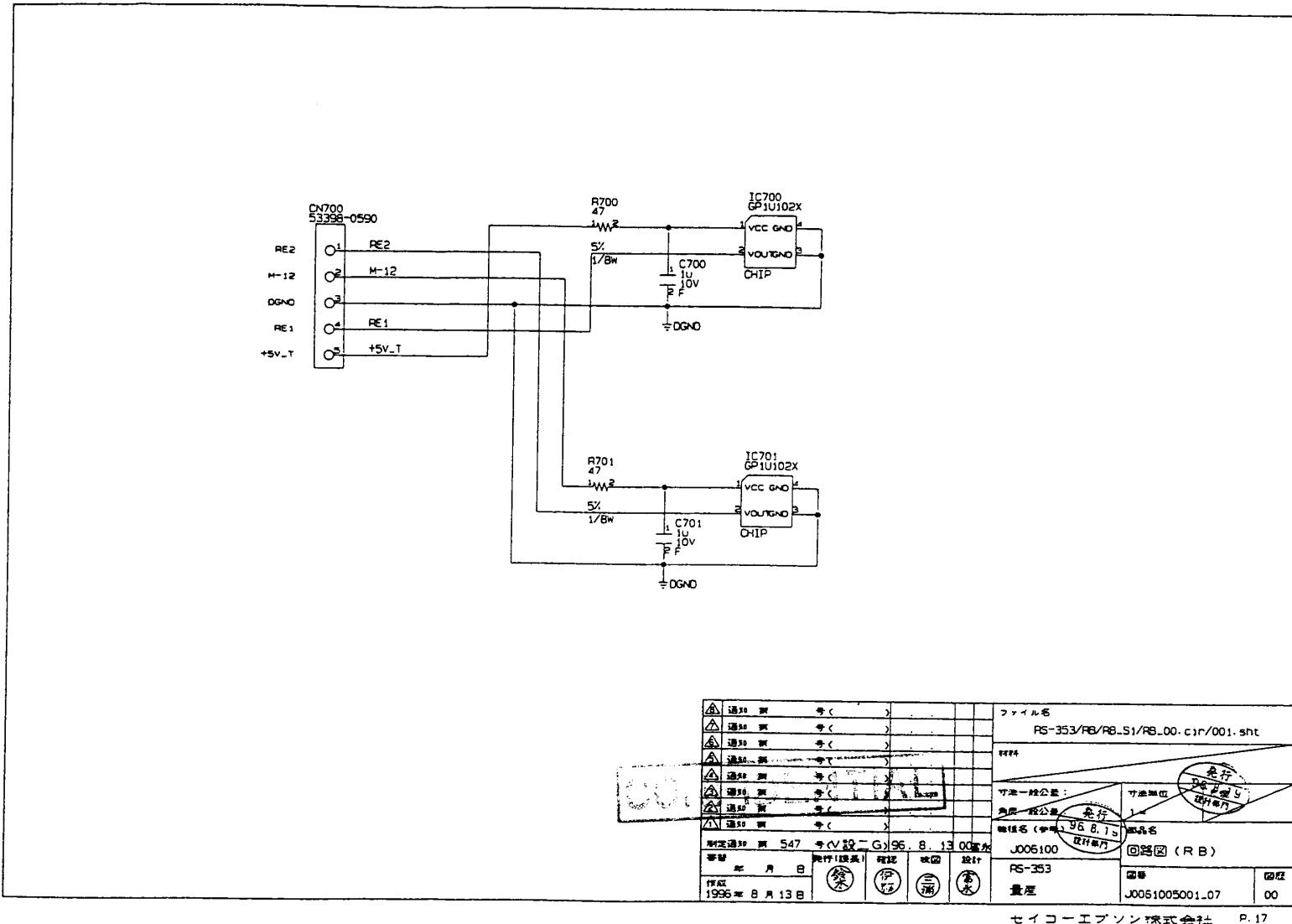
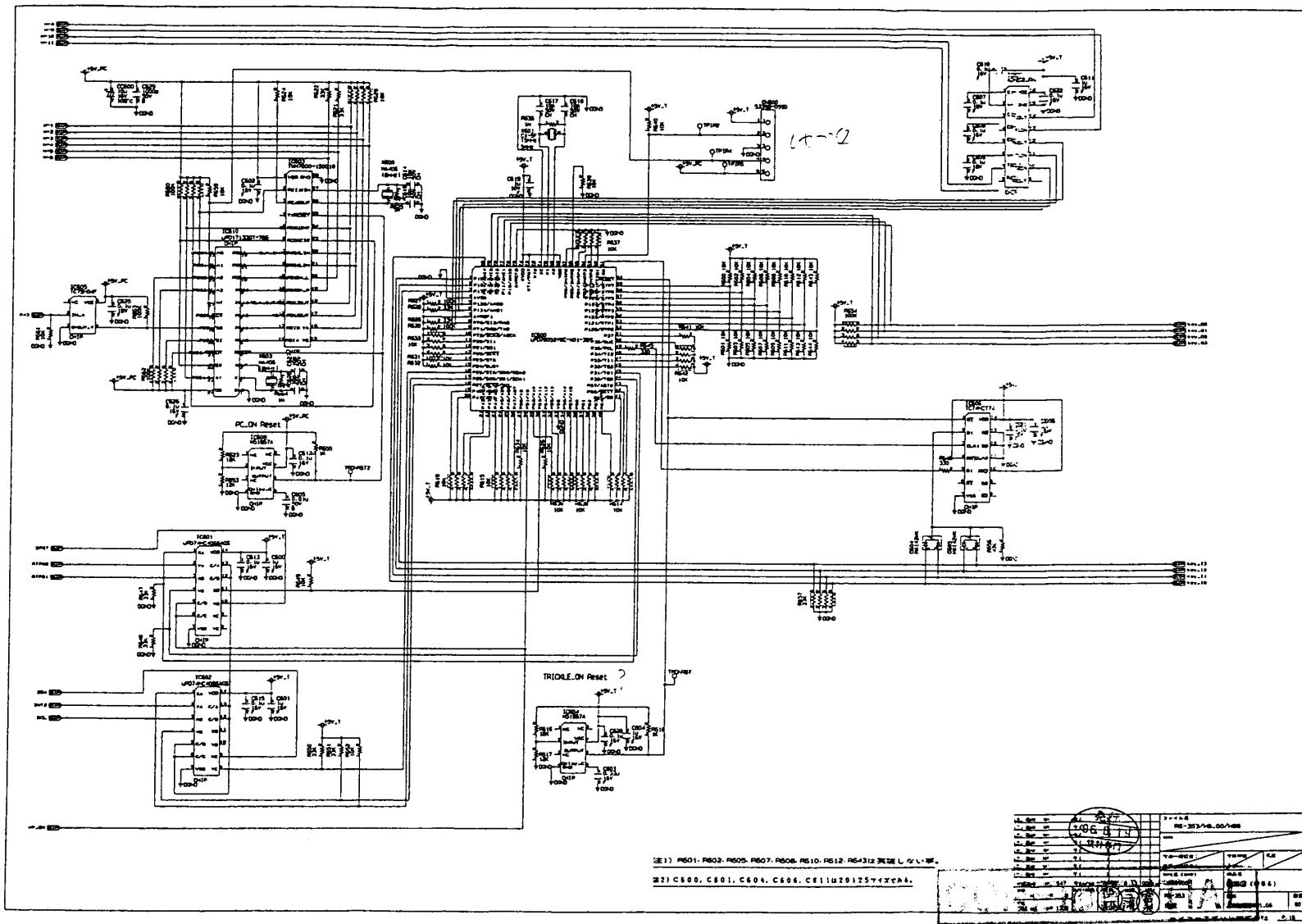


Figure A-12. Schematic Diagram 10



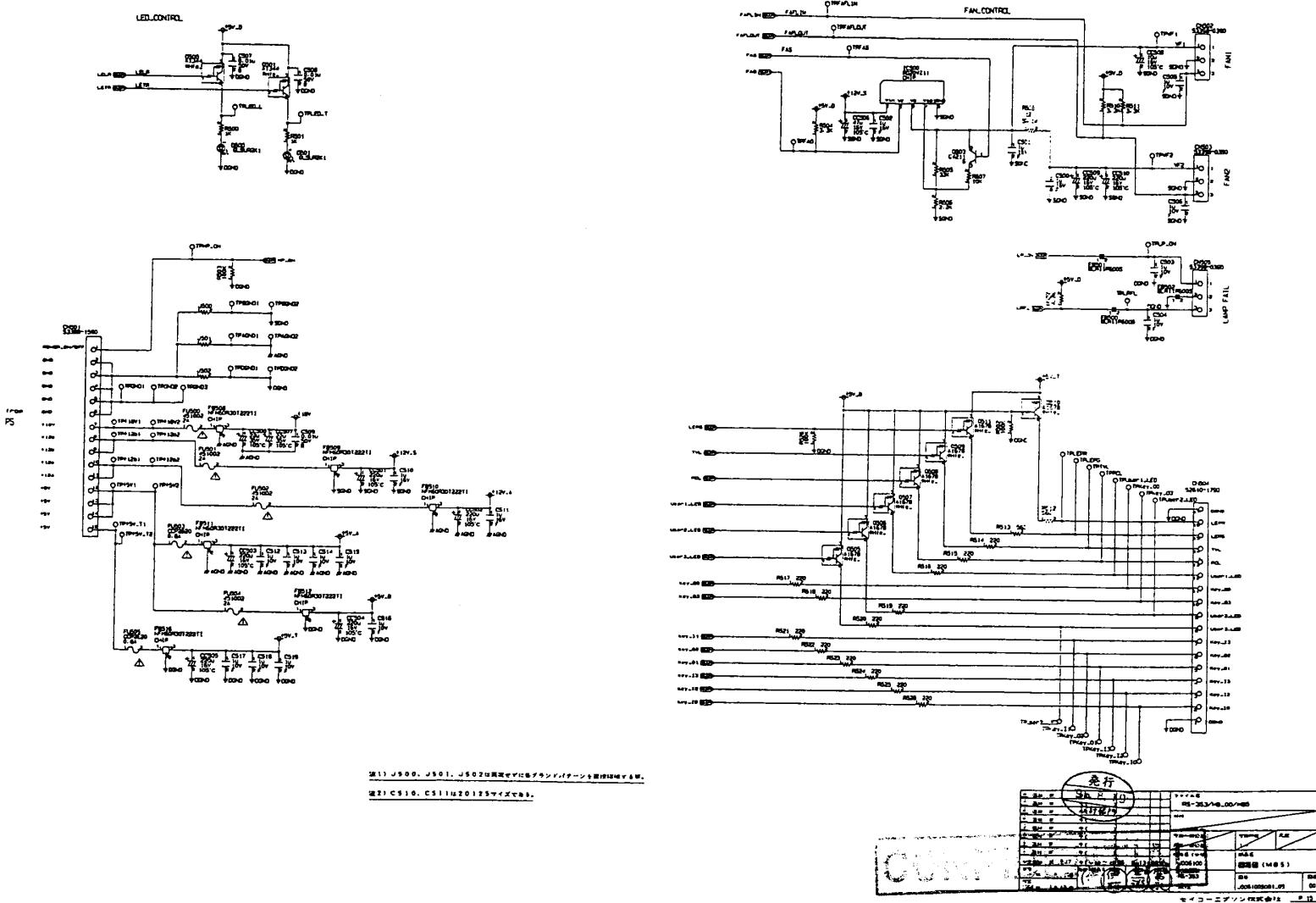
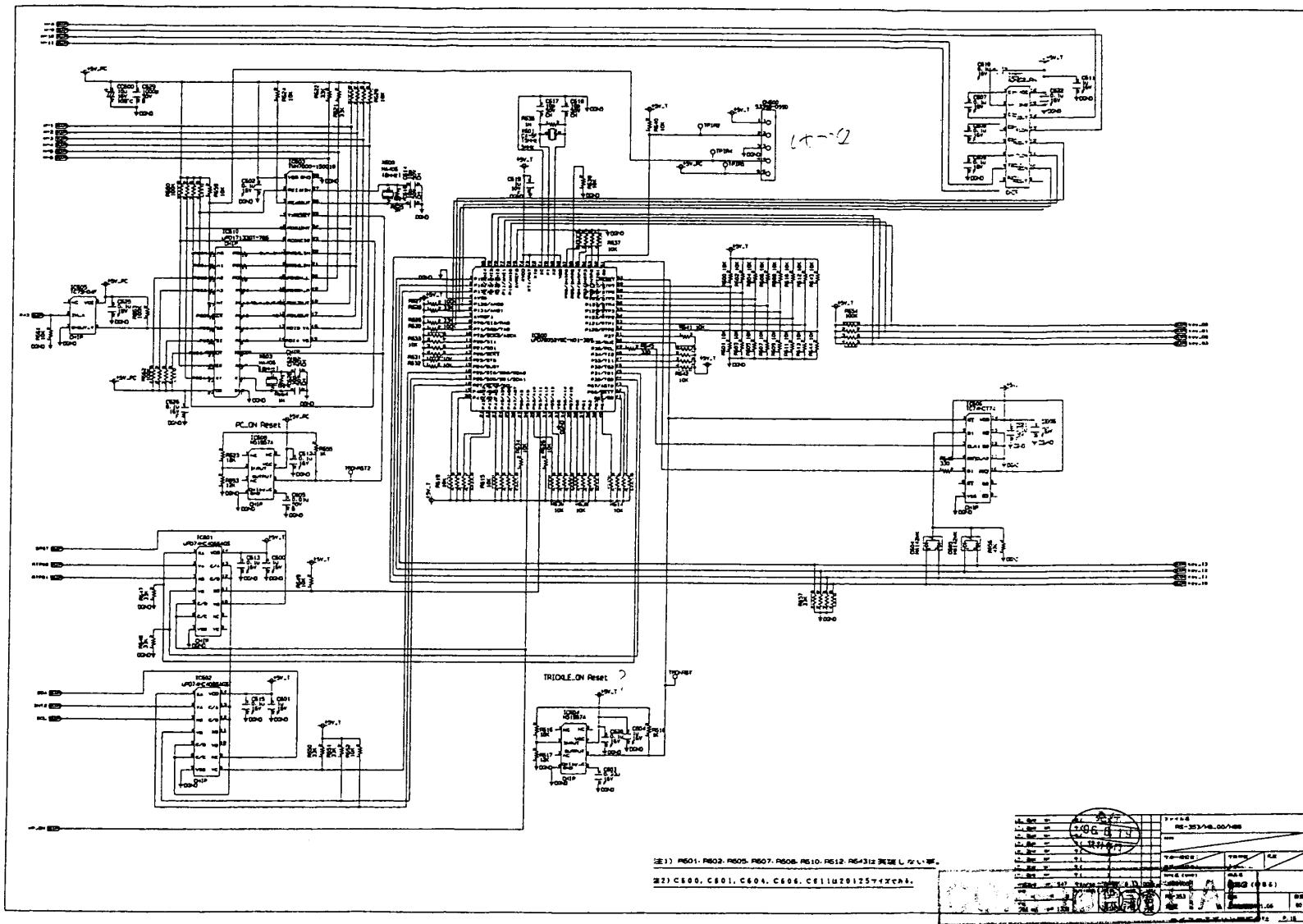


Figure A-13. Schematic Diagram 11

Figure A-14. Schematic Diagram 12



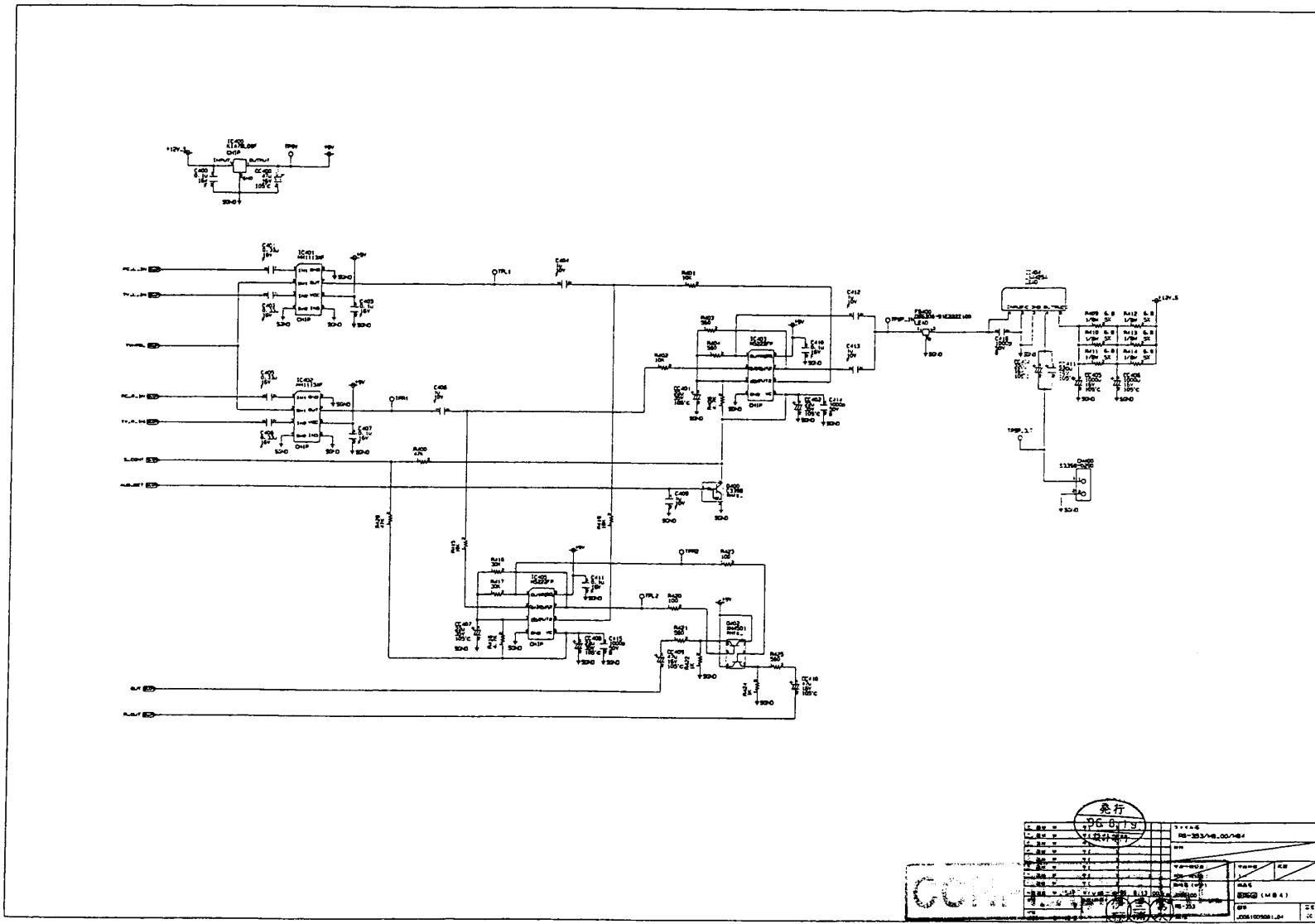
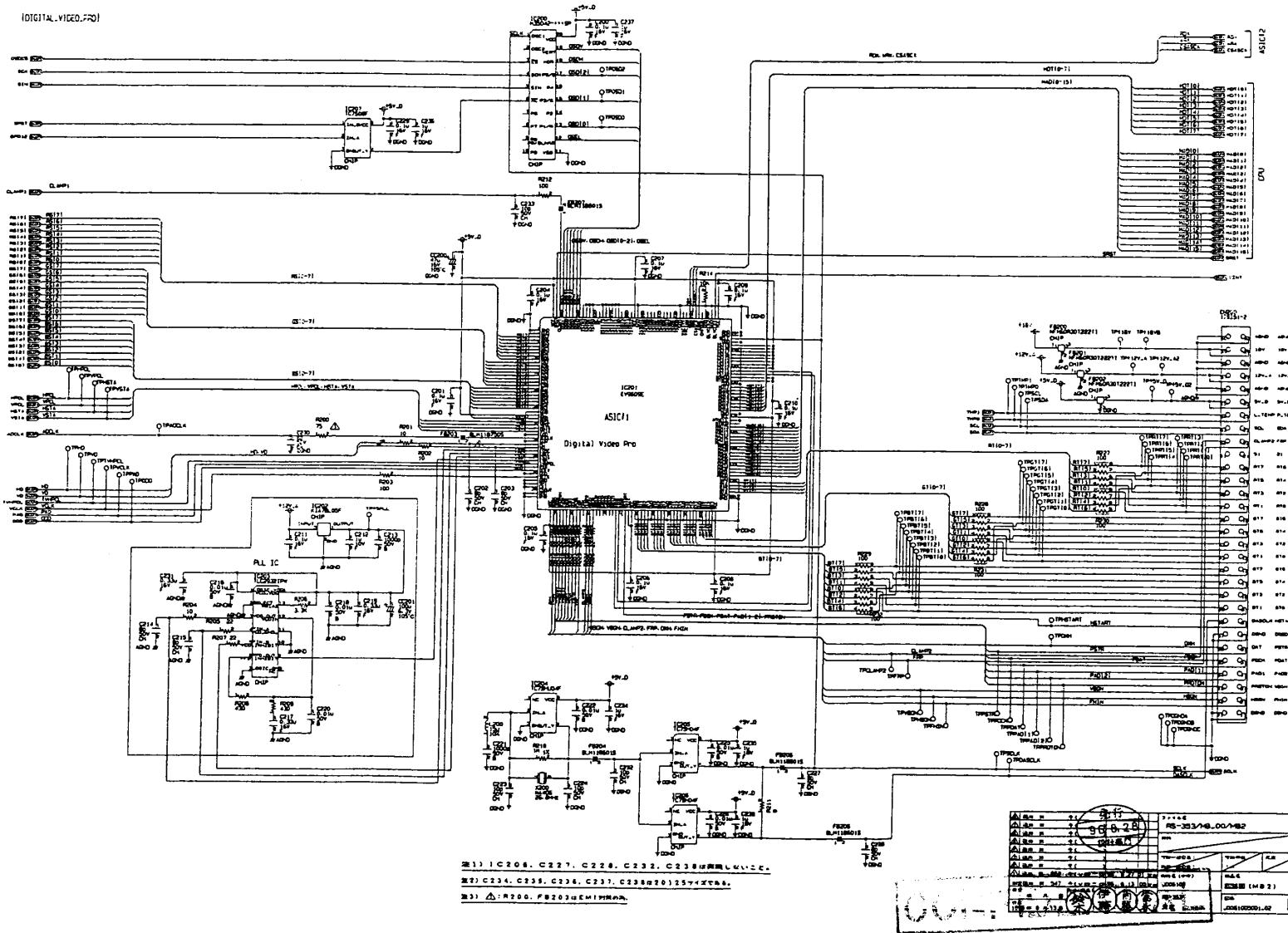


Figure A-15. Schematic Diagram 13

Figure A-16. Schematic Diagram 14



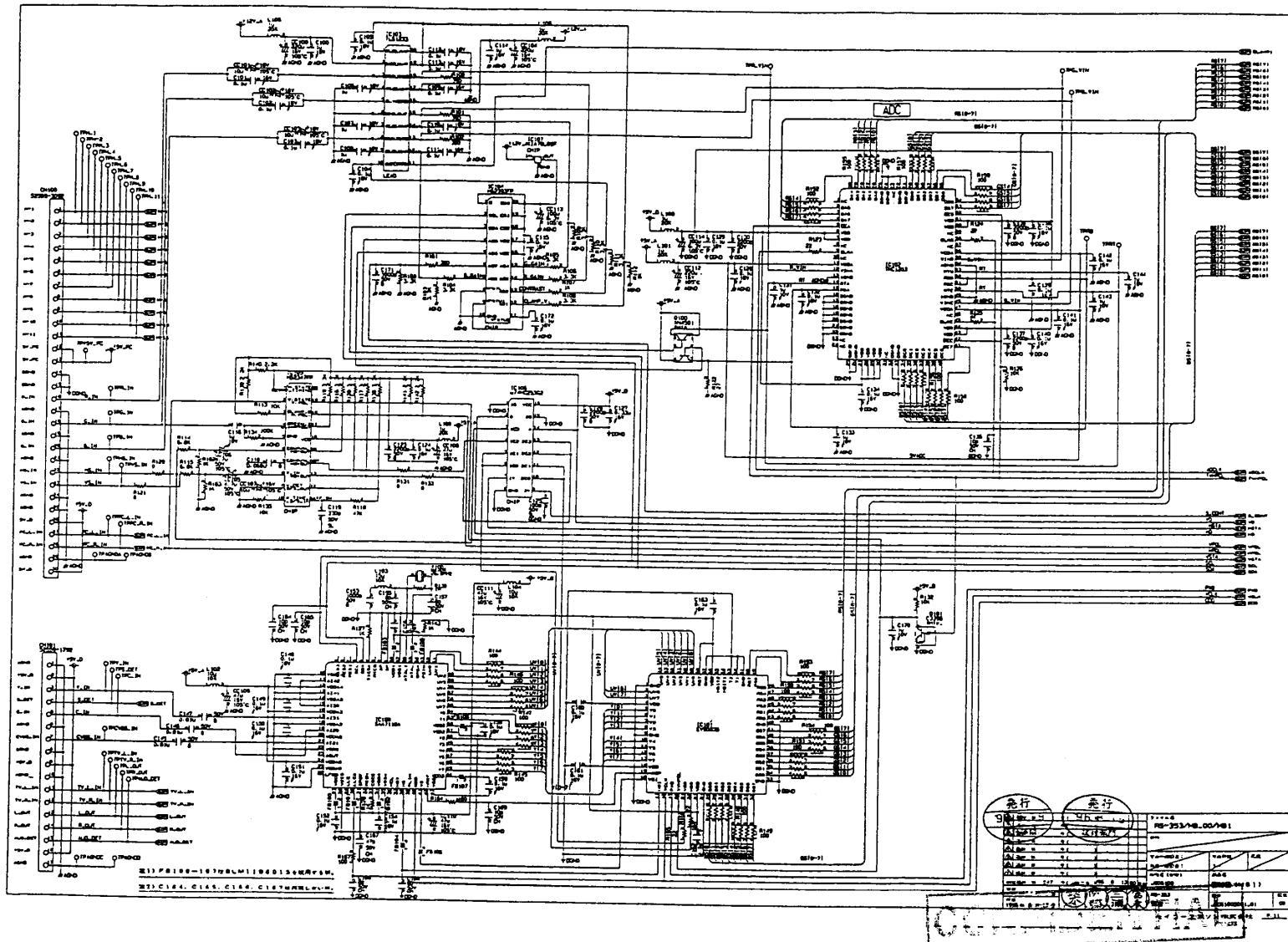


Figure A-17. Schematic Diagram 15